The Development of a New Digital Business Reporting Standard - Inline XBRL

Thesis

The Development of a New Digital Business Reporting Standard – Inline XBRL

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Abstract

Digital reporting has become one of the key elements for regulatory reporting by businesses to the government in the UK. By tagging financial information with individual codes that are based on accounting standards and regulatory reporting regime, financial reports are now transformed into eXtensible Business Reporting Language (XBRL) instance documents and can be processed by XBRL-enabled software tools. This research explores how two of the governmental bodies in the UK - HM Revenue and Customs and Companies House - got involved in a close cooperation with the XBRL community in the UK and together with IT consultants and technical experts developed a human-readable format of XBRL, known as Inline XBRL (iXBRL).

The central concern is the fabrication of the new standard through formation of a network of actors and objects involved in the process. The study adopts an Actor Network Theory perspective that highlights the complexity of technology implementation in regulatory environments using concepts from sociomateriality theory (Latour, 2005; Leonardi & Barley, 2008). It draws on documentary evidence and semi-structured interviews with regulators, software vendors, and other organisations involved in developing digital reporting facility in the UK.

The study has found that iXBRL affordances acted as a catalyst for the network to grow and the regulators to fulfil their obligations by addressing the pressures from major consulting companies, accounting professional bodies, and software vendors. The XBRL rendering functionality produced the perception of both capability for users of financial reports and constraint for filers. To overcome this constraint, the network of actors directed all resources to producing a visually more accessible rendering mechanism that was inscribed in iXBRL. By focusing on the UK unique context of the mandate of iXBRL-based filing, the thesis contributes by illustrating what was compromised and what was gained for heterogeneous groups of actors when establishing the infrastructure for digital business reporting.

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List of Abbreviations

AAT - The Association of Accounting Technicians

ACCA - The Association of Chartered Certified Accountants

ANT - Actor Network Theory

ATT - Association of Taxation Technicians

BASDA - Business Application Software Developers' Association

BCS - The British Computer Society

BIS - The Department for Business, Innovation and Skills

CF - CoreFiling

CH - Companies House

CIOT - Chartered Institute of Taxation

CT - Corporation Tax

DTS - Discoverable Taxonomy Set

E-service - Electronic Service

E-GIF – Electronic Government Interoperability Framework

E-government - electronic government

ERP - Enterprise Resource Planning

ESEF - European Single Electronic Format

ESMA - The European Securities and Markets Authority

FBI - Filing-by-Internet

FRC - The Financial Reporting Council

FSA - The Financial Services Authority

GAAP - Generally Accepted Accounting Principles

HM Treasury - Her Majesty's Treasury

HMRC - Her Majesty's Revenue and Customs

HTML - Hypertext Markup Language

ICAEW - Institute of Chartered Accountants in England and Wales

ICAS - Institute of Chartered Accountants of Scotland

IFRS - International Financial Reporting Standards

IFS - Intelligent Financial Statement

IT - Information Technology

iXBRL - Inline eXtensible Business Reporting Language

PDF - Portable Document Format

PWD - Public Working Draft

SCOT - Social Construction of Technology

SEC - United States Securities and Exchange Commission

SME - Small and medium-sized enterprises

ST - Structuration Theory

UK - The United Kingdom

USA, US - The United States of America

XBRL - eXtensible Business Reporting Language

XHTML - Extensible Hypertext Markup Language

XII - XBRL International, Inc.

XML - Extensible Markup Language

XSL - Extensible Stylesheet Language

XSLT - Extensible Stylesheet Language Transformations

List of Figures

List of Tables

Contents

Chapter 1 Introduction

This PhD thesis investigates the implementation of digital reporting for tax and company accounts in the UK and explores the development of a new standard - entitled Inline eXtensible Business Reporting Language (iXBRL). The thesis will centre on exploring how XBRL has been implemented in the UK and the experience associated with its use. To this end, this thesis will provide valuable insights into the main issues associated with the design and operation of digital business reporting languages.

Chapter 1 outlines the background of this research study and discusses the key motivations of the thesis. This will be followed by the primary research aims and objectives. It will also present the research questions of this enquiry. The chapter will conclude with summary of the structure of the thesis.

1.1 Research Motivation and Background

Before the global financial crisis regulators of the world's major economies like the United States, Australia, and Japan implemented reporting regimes that mandated filing using one data standard - eXtensible Business Reporting Language (XBRL) (XBRL Australia, 2001; Hamscher, 2002; SEC, 2002). XBRL is an open source technology which is steadily expanding its position in many national jurisdictions (XBRL International, 2018). It is designed to facilitate the automation of the exchange of business information over the Internet through allowing various stakeholders to tag financial information with individual codes that are based on accounting standards and regulatory reporting regimes (Hoffman, Strand and NYAICPA, 2001). By assigning semantic meaning to data, XBRL

is expected to improve the production, consumption, and exchange of financial information among computer platforms.

The advancement of digital reporting technology has resulted in a growing body of published research on XBRL. The interest of academic and business communities is growing with the increasing adoption of XBRL by financial regulators worldwide (Doolin and Troshani, 2007; Debreceny, Farewell and Piechocki, 2010; Troshani and Lymer, 2010; Mousa, 2011; Guilloux, Locke and Lowe, 2013). Previous research has identified challenges and benefits of the implementation of digital business reporting standards, and has particularly focused on the perspective of different actors related to the development and use of the technology. The introduction and mandate of XBRL for financial reporting resulted in debates about the role of XBRL in transforming modern financial markets. Despite being perceived in the professional literature as an efficient and cost-effective tool for business information exchange, the academic research has illustrated that its increasing adoption has not always provided a high quality and wide spread solution for standardisation of business data exchange. The XBRL implementation can inherit conflicts between implementers, users, and preparers of the XBRL report which indicates that long-simmering problems of dissemination of financial information have not been solved (Troshani and Rao, 2007; Debreceny *et al.*, 2010; Lowe, Locke and Lymer, 2012; Troshani, Parker and Lymer, 2015; Troshani, Locke and Rowbottom, 2019).

The UK setting is of particular interest because UK regulators were the catalyst for the transitioning from XBRL to iXBRL - a human-readable hybrid integrating XBRL and HTML functionalities (XBRL International Inc., 2019). XHTML is an extended XML mark-up language version using Hypertext Markup Language (HTML) - the language in which Web pages are generated (World Wide Web Consortium, 2002). In

2011 HM Revenue and Customs (HMRC) and Companies House (CH) launched a joint filing facility using the iXBRL standard, and in April 2011 HMRC required businesses to file annual accounts, returns and computations (CT600) in the iXBRL format (HMRC, 2014). iXBRL has been considered for adoption by regulators in many other jurisdictions since its development in the UK and has been proposed by the European Securities and Markets Authority (ESMA) for use as a single digital reporting standard for financial reporting in the European Market (CoreFiling, 2019; ESMA, 2016; SEC, 2018). iXBRL is fast becoming one of the key elements for regulatory reporting in a number of countries including the UK, Australia, the United States, and Japan.

A key aspect of iXBRL that has received considerable attention is its ability to present financial information in a human-readable format with XBRL tags embedded within it which "are not normally visible to a human reader, but can be displayed with suitable software when required" (XBRL International Inc., 2012a). The members of the XBRL International (XII) consortium promoting XBRL across the world have claimed that iXBRL is "more efficient" and "simple" (XBRL UK, 2015). Along with the dissemination of iXBRL, however, questions have been raised about a number of problems with its use (ICAEW, 2010). One concern is associated with control over submitted data when they are visually more accessible in a human-readable format. The mechanisms built in iXBRL can potentially change the interaction of various groups of users in the supply chain of financial information. Previous studies have not dealt in detail with the reasons why iXBRL has been developed and, most importantly, what caused the failure of XBRL to be implemented for filing tax and company accounts in the UK. Current research on this subject has been largely restricted to a limited description of the XBRL project when iXBRL has been developed (Mousa, 2011; Troshani, Parker and Lymer, 2015). There is uncertainty surrounding the factors that triggered regulators to change the project to

implement XBRL and subsequently develop the new standard. This change indicates a need to understand the role of iXBRL in eliminating the 'disconnect' between what digital business reporting is expected to do and what it is capable of doing.

This thesis seeks to explore the reasons for the emergence of iXBRL and its role in disrupting the international adoption of XBRL. Drawing upon available XBRL literature and appropriate theory, this study attempts to examine the setting in which iXBRL has been developed in order to provide valuable insights into the motives and interests inscribed in iXBRL. In addition, there is a general lack of research on the adoption of digital business reporting standards. This study therefore sets out to provide new evidence in the understanding of the development of the new digital reporting standard and add to the current body of knowledge by enhancing understanding of establishing digital business reporting infrastructure. This project will undertake an in-depth investigation of the capabilities and restrictions of digital business reporting standards by exploring the emergence of the new iXBRL standard. The aim of the current study and the research question of this thesis are discussed in the following section.

1.2 Research Aim and Research Questions

The first aim of this research study is to gain an insight into digital reporting implementation in the UK. In particular, this account seeks to investigate the transition from implementing XBRL for regulatory filing tax and company accounts in the UK to developing iXBRL.

The second aim of this study is to investigate the possible tensions of various groups of actors involved in the XBRL project in the UK which triggered and resulted in the emergence of iXBRL. This study attempts to ascertain the nature of the motives and

perspectives of regulators, technology, and other relevant actors which changed the trajectory of the XBRL project in the UK. In particular, the study seeks to address the following research question:

Central Research Question: How did a new digital business reporting standard – Inline XBRL - emerge during the implementation of XBRL for filing reports of businesses to HMRC and Companies House in the UK?

To answer this research question, this research adopts a theoretical perspective that highlights the complexity of technology development in regulatory environments using concepts from sociomateriality theory (Latour, 2005; Orlikowski, 2007; Leonardi and Barley, 2008; Leonardi, 2011a). This approach highlights the imbrication of technological objects and social and institutional relations. This thesis follows the research strategy in agreement with Actor Network Theory (ANT) methodology. The study deploys a number of ANT conceptions such as *translation*, *programme of action*, and *detour* which are further explained in Chapter 4: Actor Network Theory. One of the key framing devices deployed in this research is the concept of *affordance*. As defined by Akrich & Latour (1992, p. 261), affordance is "[w]hat a device allows or forbids from the actors – human and nonhuman – that it anticipates". In other words, affordances can prescribe and permit certain actions of actors when they interact with an artefact. This framing is applied to explore the role of technology affordances and constraints in translating actors into the XBRL network in the UK. Overall, the ANT approach will help to trace the actor-networks that came together to develop iXBRL.

The enquiry will follow two key sub-questions:

Research sub-question 1: How did the formation of the network of actors to implement XBRL lead to the failure of XBRL in the regulatory programme of action?

Research sub-question 2: How did the network of actors affect the development of alternatives to XBRL and result in the emergence of iXBRL?

This study is exploratory and interpretive in nature. Through employing a qualitative method of enquiry, this research will be able to capture a rich and detailed understanding of the development of iXBRL. As such, the research data in this thesis will be drawn from two main sources: interviews and analysis of documentary evidence from regulators and other key individuals. The data collected will be analysed using NVivo and framed by the Actor Network Theory (ANT) perspective, to identify key aspects of XBRL that influenced the development of iXBRL. ANT will enable understanding the emergence of iXBRL as a complex historically specific process of continuous socio-material translation.

The reader should bear in mind that the study is mainly concerned with the transition from XBRL to iXBRL that occurred between 2001 to 2011. The research will focus on the activities from the early stages of the XBRL project in the UK (2001-2006) till the time when agreement to mandate iXBRL was achieved (2007-2009). The timeline of the XBRL project will be discussed in detail throughout the thesis (Chapter 3, Chapter 6, Chapter 7). It is beyond the scope of this study to undertake a longitudinal study of the entire XBRL filing project in the UK due to time and other practical constraints.

1.3 ANT concepts

To clarify the research questions, it is important to explain what constitutes *technology development, adoption* and *implementation* in this research. There are multiple interpretations of these processes, and the differences are based on the complexity of interpreting what

technology is. This research will rely on the ANT conceptualisation of technology briefly presented in this section and further explained in Chapter 4.

From the perspective of this study - a socio-material perspective - people and objects exist only in relation to each other. They are inherently inseparable and constitutively entangled (Orlikowski, 2007). This view is based on accepting mutual and performative existence of the material and the social (Pickering, 1993). It also leads the researcher to consider the emerging technology as the outcome of interaction of human and material agencies (Leonardi, 2011a). According to Orlikowski and Scott (2008), if the researcher assumes an inherent inseparability between the technical and the social, technology cannot be seen as a specific event or process within an organisational context of time and place. Rather it should be examined as an integral part of "all organizing at all times, places, and circumstances" (Orlikowski and Scott 2008, p. 454).

Technology in this study will be viewed as a part of network of various socio-technical actors - organisations, people, and technology objects – that form, deform, and shape broader interlocking networks (Law, 1984). It is the actors' interconnection within the network that results in the emergence of a new technological object (Leonardi, 2009). Technology development occurs when a technological object comes into being and gains enough support to become a meaningful actor in the network (Orlikowski, 2007).

By adopting Leonardi's (2009) view, the researcher will attempt to explore mutually constitutive relationship between the technological and organisational change that occurs throughout the entire process of technology development. The study will research this constitutive assemblage linking social and technical elements together (Leonardi 2009). It will also be assumed that implementation does not stop technology development, despite it being surrounded by micro socio-material activities leading to its transformation

(Leonardi 2009). Adopting this perspective, technology development in this study will be referred to as a process consisting of cycles and amongst them are adoption and implementation. Despite separating these cycles into stages during the empirical part of the research (see Figure 3), adoption and implementation will be generally viewed as part of the technology development activities that stimulates sharing knowledge between actors about what technology can do. For instance, the adoption process may go beyond mere processes of enactment and encompasses those actors at the final stages of development of, for instance, puctualisation (Piñeros Garcet, 2012) occurring when an iXBRL user simply uses the system without knowing in detail the roles of other actors for making this process possible. However, when an argument for this thesis is developed, the conceptualisation of the technology development will include all the socio-material activities leading to the change in the network – emergence of a new actor.

Thus, given the central aim of the research, this work is to addresses the development of iXBRL that will demonstrate how iXBRL emerged as the outcome of a temporary human and social agency.

1.4 Thesis Structure

The overall structure of the thesis comprises nine chapters, including this introductory chapter – Chapter 1. It presents the central research questions as well as two sub questions that are also restated in Section 5.1 of Chapter 5. The summary of the next eight chapters is presented below.

Chapter 2 positions the research within the context of a worldwide XBRL adoption. It also evaluates the XBRL functionality from the perspective of heterogeneous groups of actors and assessing governance of XBRL. Moreover, Chapter 2 describes the key

concepts relevant to the research project and gives a brief overview of the complexities associated with the development of the new technology.

The main purpose of Chapter 3 is to review the existing literature on XBRL and demonstrate to the reader what is known about the digital business reporting role in the e-government infrastructure. This chapter also outlines the key issues of XBRL adoption that have been raised in the previous research and provides a critical review of the XBRL literature that is relevant to the understanding of the development of iXBRL.

Chapter 4 of the thesis provides a conceptual theoretical framework based on ANT. It begins by laying out the theoretical dimension of the research, and reviews the main social theories in accounting technology and e-government research. Having considered the most prominent theories in the research of development of accounting technology, the chapter argues that theoretical underpinnings of ANT helps to understand how the tension of the implementation of XBRL emerged and explore the characteristics of the technology. The chapter also introduces the key ANT concepts such as translation, affordances and programme of action that help to cover the complexity of the development of digital business reporting standards.

Chapter 5 provides the methodological discussion and explains the research design linking various methods of data collection and analysis in this study. It discusses the epistemological and ontological stance of this study. The chapter also considers in detail the applicability of Actor Network Theory to the research and discusses the researcher's choice for data collection techniques and methods.

The thesis contains two empirical chapters - Chapter 6 and Chapter 7 - that will introduce the empirical work and analysis of the semi-structured interviews and documentary evidence. It will collate the data obtained in each of the interviews conducted and then

interpretively analyse the interview data and documentary evidence referring to the theoretical framework and methodology outlined in Chapters 4 and 5 respectively.

Chapter 8 will discuss the findings of the research in relation to the research aim and research objective. Specifically, the chapter will describe the process of the development of iXBRL within a socio-technical setting, drawing out themes which indicate significant controversies and tensions across the actors' interpretations. The chapter will draw upon the entire thesis, tying up the various theoretical and empirical implications of the current study. The chapter will illustrate how the implementation of widely accepted XBRL has resulted in the development of iXBRL and evaluate the degree to which iXBRL can affect the current network of relations of varied groups of actors including regulators, investors, policy makers, businesses etc.

he final chapter of the thesis, Chapter 9, will discuss the main implications of the findings and presents the theoretical and practical contribution of this study. The chapter will end by identifying the limitations of this study and directions for further research.

Chapter 2 Research Context. Overview of XBRL Network

2.1 Introduction

Chapter 2 introduces the background to the study and presents the research of the functionality of XBRL. The advancement of the internet as a technology affects different aspects of societal and organizational life. In particular, the rapid development of the socio-technical objects disseminating information, exchanging and communicating business data result in certain affordances and constraints for multiple groups of actors (Tsatsou, 2016). Online technology provides new means and new scope of interactivity between preparers and consumers of business and financial reports (Beattie and Pratt, 2003; Hodge, Kennedy and Maines, 2004; Ghani, Laswad and Tooley, 2011). The exchange of accounting information has progressed to the stage when it can be significantly automatized (Quattrone, 2016). Such arrangements are mainly possible due to the recent technological developments utilised by the preparers of financial reports, including technologies like enterprise resource planning systems (ERPs), accounting software systems, and accounting digital reporting standards such as XBRL. The process of financial reporting is influenced by the information technologies and advanced software systems (Lodh and Gaffikin, 2003; Newman and Westrup, 2005; Quattrone, 2016). These objects allow preparers of the accounting information to produce financial and business data in a standardised format. The increasing standardisation of the production of accounting using these technological objects requires a specific setting in which the international standards can develop. In the next sections of this chapter the researcher will explore the previous research works analysing the setting of the XBRL

adoption and review the relevant literature on social and technical aspects of the technology (Law, 2002). This chapter will present the research of the functionality of XBRL and explore its aspects relevant to further discussion of XBRL affordances included in Chapter 3.

2.2 Early Development of XBRL

The history of the development of XBRL can be traced back to 1998 when a certified public accountant Charles Hoffman initiated development of XML-based language that could be used for business reporting (American Institute of Certified Public Accountants, 2018). The funding to commence the development of the XBRL technology was provided by the American Institute of Certified Public Accountants (AICPA) and the XBRL steering committee formed to develop a "new language for the entire financial world to use" (Kernan 2009, p. 11). In 1999 the first prototype eXtensible Financial Reporting Markup Language (XFRML) was created and after technical amendments was named XBRL. It was soon realised, by the XBRL committee, that to address the opportunities of XBRL would only be possible if the technology gained enough support and acceptance among heterogeneous groups of actors. The challenges of replicating financial standards using XBRL as one of the tools for improving standardisation have been recognised by its adopters early.

> *XBRL would require a different approach; the ability to reach consensus. Voluntary consensus. It would only work if the whole world agreed. (Kernan 2009, p. 3)*
>
> *The financial world had become trapped in an electronic Tower of Babel, endlessly copying and pasting information from one system into another…And for a group of competitors to create a new language for the entire financial world to use—that would require*

> *fierce agreement. It had to start with us. We had to agree. We had to agree to agree. (Kernan 2009, p. 11)*

XBRL was promoted by the members of the committee to regulators, including SEC and Australian Federal Government, financial institutions, software vendors, accounting firms and major businesses that consequently joined the XBRL actor-network and became part of the XBRL steering committee. The network of actors involved in the development of XBRL grew and achieved wide acceptance of the technology as lead business data standard that could be used for financial reporting by governments around the world. By 2003 XBRL Steering Committee included 170 members including accounting bodies, financial regulators, and businesses from different countries (Jones & Willis 2003, p. 31). A growing interest in XBRL expressed by a number of major corporations in the USA promised even better prospects for XBRL diffusion in the near future. In July 2000 the XBRL committee released the XBRL specification and the first taxonomy for financial reporting based on US GAAP (Engel *et al.*, 2008). And in February 2001 the XBRL gained enough support for the establishment of the XII consortium formed to promote XBRL adoption and support the development of XBRL specification (XBRL International Inc., 2001).

At the same time in parallel with the increasing publicity of XBRL mainly driven by the XII consortium, regulators in a number of countries expressed interest in the new standard. Among the pioneering governmental agencies committed to the project to adopt XBRL for business-to-government reporting were Australian Federal Government, the US Securities and Exchange Commission (SEC), the Canadian Securities Administrators (CSA), and Japanese Tokyo Stock Exchange (TSE). In 2001 many local national branches of the consortium were formed including XBRL Australia, XBRL Canada, XBRL Germany, XBRL IASB (International Accounting Standards Board),

XBRL Japan, XBRL Netherlands, and XBRL UK (Kernan, 2009). The next section of the thesis will evaluate the XBRL functionality and explore the technical aspects of the technology.

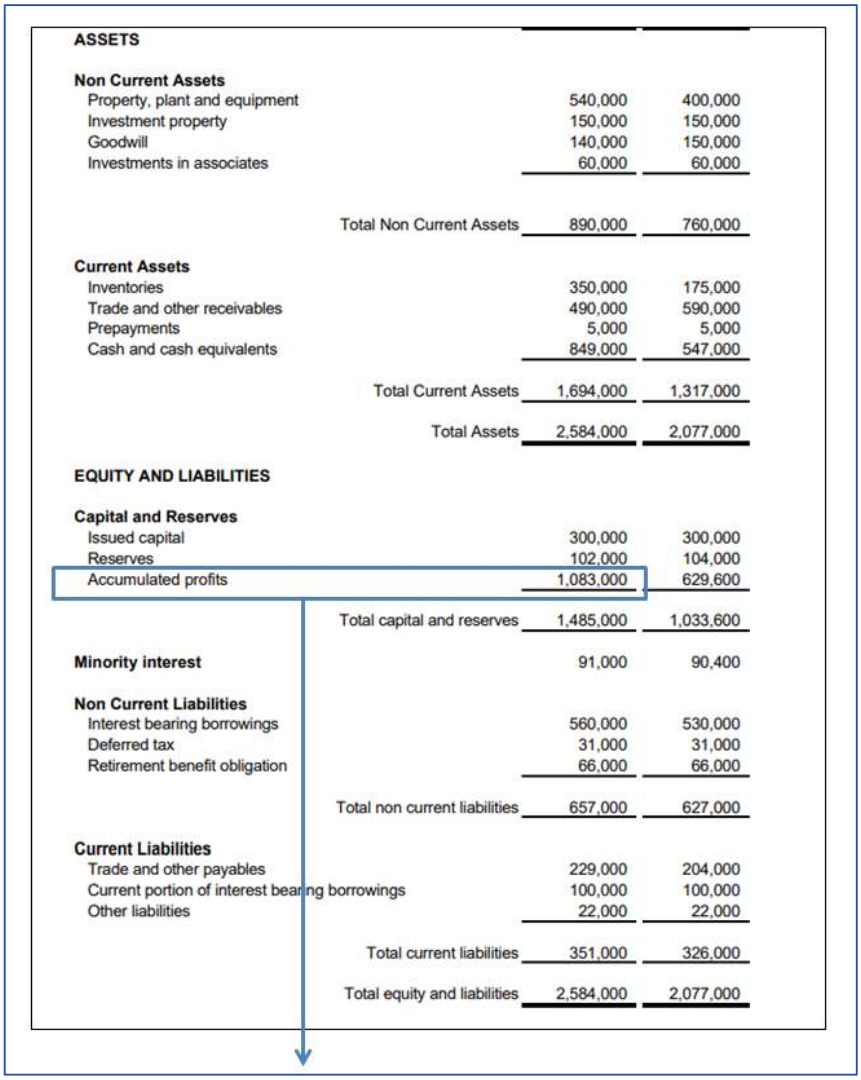
2.3 Functionality Embedded in XBRL: Role of Taxonomies

Prior to analysing XBRL as a socio-technical object within the network of relationships between different actors in the UK, this chapter will illustrate some of the technical functionality that has been embedded in XBRL and illustrate how XBRL generates the financial reports. XBRL is an open data standard used for reporting business data that allows tagging financial information with individual codes that are based on accounting standards and regulatory reporting practice. XBRL adoption is aimed at improving modelling and structuring of information and semantic processing of business reporting (XBRL International Inc., 2005). XBRL is one of the XML-based standards that uses XML syntactical architectures and a number of XML technological elements such as XML Schema, XLink[1], XPath[2] to present the semantic meaning of business concepts. In this study the researcher is interested in the aspect of XBRL associated with the communication and exchange of financial information through composition and analysis of tagged financial reports. XII consortium is the main organisation that maintains and develops XBRL specifications and leads the efforts to increase its uptake internationally. Taxonomy is an integral part of the XBRL-enabled reporting as it represents the individual business concepts and the relationships between them.

[1] XLink is used to create hyperlinks in XBRL document.

[2] XPath is a syntax used to navigate through elements and attributes in an XML document

Figure 1: XBRL Instance Document and Taxonomy Excerpts of Sample Consolidated Balance Sheet (XBRL International Inc. 2003, p. 11)



ASSETS		
Non Current Assets		
Property, plant and equipment	540,000	400,000
Investment property	150,000	150,000
Goodwill	140,000	150,000
Investments in associates	60,000	60,000
Total Non Current Assets	890,000	760,000
Current Assets		
Inventories	350,000	175,000
Trade and other receivables	490,000	590,000
Prepayments	5,000	5,000
Cash and cash equivalents	849,000	547,000
Total Current Assets	1,694,000	1,317,000
Total Assets	2,584,000	2,077,000
EQUITY AND LIABILITIES		
Capital and Reserves		
Issued capital	300,000	300,000
Reserves	102,000	104,000
Accumulated profits	1,083,000	629,600
Total capital and reserves	1,485,000	1,033,600
Minority interest	91,000	90,400
Non Current Liabilities		
Interest bearing borrowings	560,000	530,000
Deferred tax	31,000	31,000
Retirement benefit obligation	66,000	66,000
Total non current liabilities	657,000	627,000
Current Liabilities		
Trade and other payables	229,000	204,000
Current portion of interest bearing borrowings	100,000	100,000
Other liabilities	22,000	22,000
Total current liabilities	351,000	326,000
Total equity and liabilities	2,584,000	2,077,000

Instance Document Excerpt

< <!-- Row:328 Ending balance, Accumulated Profits -->

<ifrs-ci:RetainedProfitsAccumulatedLossesEndingBalance numericContext="Current_AsOf">1083000</ifrs-ci:RetainedProfitsAccumulatedLossesEndingBalance>

XBRL Taxonomy Excerpt

<element id="ifrs-ci_RetainedProfitsAccumulatedLossesEndingBalance" name="RetainedProfitsAccumulatedLossesEndingBalance" type="xbrli:monetaryItemType" substitutionGroup="xbrli:item" xbrli:balance="credit"/>

Figure 1 illustrates an extract from a sample Consolidated Balance Sheet. The XML element of an XBRL file – instance document – contains the business facts and reference to the taxonomies called a Discoverable Taxonomy Set (DTS) that define the elements of the instance documents and explain their relation to each other. <xbrli> element derives from *XBRL Instance* document. The highlighted value of accumulated profits (1,083,000) is tagged using the context that describes the location of the value in the document <Row:328 Ending balance, Accumulated Profits>, the taxonomy used to define it <ifrs-ci>, and other descriptive information <RetainedProfitsAccumulatedLossesEndingBalance>. Each item of the financial report has a reference type that can be used to identify the source of that item. For instance, the taxonomy excerpt presented in Figure 1 defines the element <RetainedProfitsAccumulatedLossesEndingBalance> and describes its structural attributes (e.g. <xbrli:balance="credit">). The references to taxonomies can be linked to a *linkbase* - a collection of links that "reference elements to the external resources that justify their existence and that contain an explanation, definition or example of the use of the particular financial concept, and they do define relations between elements according to different criteria" (Calvert, 2007). An XBRL taxonomy contains the references to linkbase. Taxonomies are an important element in helping to understand the functionality of XBRL as every data item of the information reported should be classified according to the taxonomy rules and then included into an instance document so that it can be further processed by XBRL-enabled software tools. Instance documents are used with a *stylesheet* or in conjunction with the software that produces stylesheet. By tagging financial information with individual codes financial documents are converted into XBRL instance documents.

2.3.1 Rendering functionality

Another important issue of the XBRL functionality is associated with the presentation of the XBRL reports. The XBRL technical community addressed it by including the *presentation linkbase* in the XBRL 2.1 specification (XBRL International Inc., 2005). Specifications are central to XBRL's successful operation (XBRL International Inc., 2002) and allow software vendors and programmers to prepare reliable software applications using specifications as a technical guidance (Willis 2005). According to XBRL 2.1 specification, presentation linkbase establishes relationships between individual items in a taxonomy for presentation purposes, or, stated differently, it describes the presentational relationships between concepts in taxonomies which allows XBRL software applications to render instance documents by using the reference order defined by taxonomy (Calvert, 2007). In practice, the presentation linkbase attached to an XBRL instance document present the data in exact order as it is prescribed by preparer who uses XBRL taxonomy (SoftVen7a). Presentation linkbase is accompanied by a label linkbase that provides human-readable descriptions of the accounting meaning of a taxonomy element. The latter normally matches the wording of the accounting standards. This functionality of XBRL that prescribes the presentation of the XBRL instance documents in human readable form is often called standardized rendering (Calvert, 2007).

Interestingly, this rendering approach can be adopted in more than one way depending on the interests and needs of receivers or preparers.

> *Some receivers may wish to view reports whose presentation is determined by preparers. This may be a matter of policy, particularly to avoid the risk of misunderstandings between the receiver and preparer. In these circumstances, receivers will typically receive a wide variety of formats and will not have any*

> *direct control over the format used…Other receivers may be in a position to impose a standard view on submissions, irrespective of any presentation desired by preparers. Both receivers and preparers may have to follow the requirements of legislation which determines how data in some financial reports is presented for viewing. For example, some national legislation determines the content and ordering of data in the balance sheet. In some cases, receivers may be responsible for the external publication of submissions in human readable form. In these cases, some may have to publish in a format required by the preparer; others may be able to impose the format of publication. (Calvert, 2007)*

As can be seen from the evidence above, a variety of methods can be used to apply the rendering functionality of XBRL. Each has its advantages and drawbacks that can allow or constrain the production, processing and analysis of the XBRL data.

The functionality of XBRL described above has the potential to afford users of financial information to manipulate data in a more efficient way than electronic formats such as HTML and PDF. One way it can be achieved is associated with XBRL allowing comparability between financial reports. By assigning tags to the items of financial reports, XBRL affords the action of users to classify these items and compare them across the reports. One major issue of XBRL with achieving comparability objectives is associated with the references to external sources like accounting standards that define elements of business reports and explain the relationship between different items.

All this information is recorded in taxonomies that tend to constrain or afford the actions of XBRL users, depending on the way XBRL is implemented. To actively engage with XBRL taxonomies, XBRL users implementing XBRL need to have a clear understanding of how they introduce the accounting rules and principles in the taxonomy. Depending on the selected approach of taxonomy design, XBRL can allow the flexibility of filers to

extend them by creating new tags or use the stylesheets that have strict rules of representing the information in the XBRL instance documents. Development of the architecture of taxonomy can either be aimed at mirroring the accounting standards or reflecting the structure of the documents for submission or focus on the data.

> *Some taxonomies model the applicable accounting or financial standards; some model the required reporting documents; and some model the underlying data…Some taxonomies are very permissive when it comes to extension, to the point that "anything goes"; some taxonomies provide specific extension points so that extension can be controlled, if not actually defined; and some taxonomies provide specific mechanisms to support extension (Greener, 2015).*

The two functionalities of XBRL – comparability and flexibility of taxonomies - are closely interlinked and associated with taxonomies. Comparability is an important functionality of XBRL that regulators apply to initiate the government projects to implement XBRL, whereas extensibility of taxonomies allows regulators to establish control over the shape and nature of XBRL filings and constrain to the filers who may have less freedom in presentation of disclosures. Chapter 4 will demonstrate how they represent affordances that concern perception of XBRL by different actors. Next section of the chapter will present the complexity of the adoption of the technological standard such as XBRL.

2.4 Key Actors in XBRL Network

What the ideal preconditions for the international standards and rules are have been the subject of multiple research studies (Hanseth *et al.*, 2006; Grotnes, 2009; Troshani and Lymer, 2010; Lyytinen and Damsgaard, 2011). Numerous research studies have illustrated the heterogeneity of the setting of the XBRL development (Lee and Hassard, 1999;

Bonsón, Cortijo and Escobar, 2009; Locke, Lymer and Lowe, 2009; Debreceny, Farewell and Piechocki, 2010; Troshani and Lymer, 2010; Mousa, 2011). The research evidence suggests that it takes multiple groups of actors to develop XBRL (Troshani and Doolin, 2005; Pinsker and Li, 2008; Debreceny *et al.*, 2009; Troshani and Lymer, 2010; Mousa, 2011; Guilloux, Locke and Lowe, 2013). The XBRL community involves business report preparers, consumers of business data, industry associations, industry consortia, regulatory agencies, software developers, and software vendors. Driven by different interests and needs, these organisational and individual actors work together to construct, maintain or oppose the XBRL development by (dis)connecting with a range of technological actors. Accordingly, the previous research followed the outlined actors by exploring XBRL from different perspectives and has illustrated that this complex network of associations between different actors creates tensions associated with legal, political, and technical issues. The next part of this chapter will present the review of the literature on the main issues of the XBRL adoption and the main affordances and limitations of the technology. It will demonstrate what is the social and technical constituency of the XBRL adoption and how this research can extend the literature by exploring the development of iXBRL.

There is strong research evidence that the worldwide adoption of XBRL is associated with the efforts of the XBRL International consortium (Debreceny *et al.*, 2009; Dunne *et al.*, 2009; Troshani and Lymer, 2010; Troshani, Parker and Lymer, 2015). A number of studies have discussed the main alliances in the XBRL national projects to promote various ideas and concepts of the XBRL-enabled digital business reporting are formed around the XII and its local branches (Locke and Lowe, 2007a; Ghani, Laswad and Tooley, 2009). While regulators have the role of adopters of the standard and create a form of 'lock in' to demonstrate its benefits (Oshri, Vries and Vries, 2010), the XII is

actively assisting them in seeking these alliances (Guilloux, Locke and Lowe, 2013). The next section will outline the main structure of the XII to develop an understanding of the overall impact of the XII on XBRL adoption worldwide.

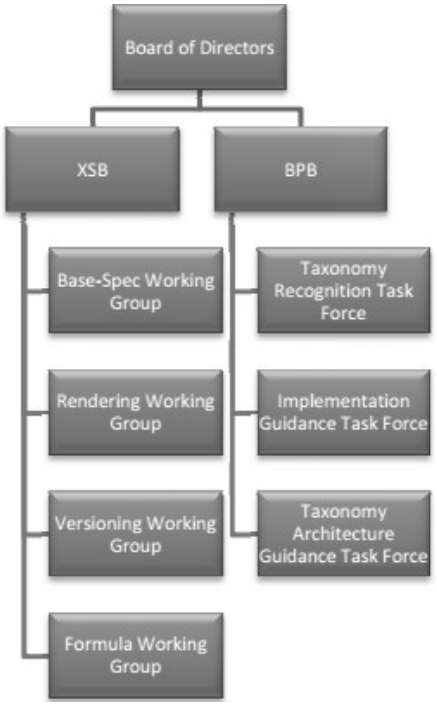
XBRL is a freely available data standard governed by the XII - a non-profit consortium based in Delaware in the US. The consortium has a membership model and aims at improving digital business reporting in the public interest. Its key task is to coordinate efforts in local jurisdictions and to promote the adoption of XBRL (XBRL International Inc., 2002). The XII manage the development and maintenance of the technical specifications of XBRL through two boards, the XBRL Standard Board (XSB), and the Best Practice Board (BPB), supported by working groups. The XII board of directors include nine elected members - typically senior representatives of the accounting profession, governmental officials, regulators, software vendors, technical and financial consultants from different countries. There are two broad groups of members in the XII: (1) jurisdictions comprising governmental regulators and authorities, accounting representative bodies, and other professionals contributing to the work of the consortium, and (2) direct members including organisations and individuals of different profiles yet similar interests of the use of the XBRL data standard for business reporting. Out of forty countries that have established XBRL projects for regulatory reporting, 24 are current members of the XII (XBRL International, 2018).

National governmental authorities work in close collaboration with regional branches of the XII. National branches working under umbrella of the XII focus on coordinating efforts and projects in a specific region or type of business reporting regime by working on a range of initiatives. One of the examples of regional collaboration originated from wider cross border communities is XBRL Europe (XBRL Europe, 2018). Most of the

European XBRL projects initiated by the European institutions and authorities are heavily supported by XBRL Europe (XBRL Europe, 2016). It was created in 2008 to establish coordination between European Commission, the European Parliament, the European Central Bank, and supervisory authorities such as European Securities and Markets Authority (ESMA), European Banking Authority (EBA), and member states national jurisdictions.

As the XBRL standard requires continuous work on improvement of the reporting infrastructure (Dye, 2009), various working groups of the XII combine their efforts for creating a platform for negotiating the relevant issues and challenges of XBRL adoption to support the main principles outlined by the consortium. The official working structure of the XII as of 2015 is presented on Figure 2.

Figure 2: Governance Structure of the XBRL International Inc. (XBRL International Inc., 2012b)



The group formations of the XII can illustrate the main issues and area of responsibility of the consortium. For instance, the Base Specification working group oversees stability

of the XBRL specification, whereas the Rendering working group are concerned with the rendering (data presentation) issues of the XBRL digital reports. Notably, individual members of the XII can simultaneously hold membership in multiple working groups (XBRL International Inc., 2012b).

2.4.1 XBRL Taxonomies Governance

The development of the XBRL specification is framed by the standard development process based on the international norms of global standard organisations, including the World Wide Web Consortium (W3C) (O'Riain and Curry, 2012). The process is comprised of internal and public review by technical specialists from a wide range of organisations. The specifications and their technical amendments are first released for the internal consortium's review that is followed by the official recommendation for public comments and review. In the same way, initial versions of taxonomies are also circulated as working drafts at first, and after that they are released for a public review to be finalised. As such, there are three stages of the development of taxonomies. Firstly, when the public working draft has been reviewed, taxonomy receives the status of the XBRL specification, after that it is (dis)approved by the consortium, and then published on the XBRL International official website for a public review. The final taxonomy version gets a release number and remains permanently available online (Deshmukh *et al.*, 2006). All working groups take an active part in the review of specification and taxonomies (XBRL International Inc., 2003).

2.4.2 XBRL International Consortium as Adopters

There is strong research evidence to suggest that engagement of the market-driven XBRL consortium with the regulatory authorities and their allies, triggers the development of the XBRL projects within regulated national jurisdictions (Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013; Troshani, Parker and Lymer, 2015). The international governance of the consortium comprising the national jurisdiction branches and the membership fee system have made the XII decentralised which allows efficient formalisation of the efforts on the XBRL implementation locally by forming alliances with regulators and other actors. The starting point of the development of the XBRL infrastructure has commonly been the establishment of the national XBRL International branch which then actively participates in building a network of technology, regulators, professional accounting bodies, software vendors, and other relevant actors (Mousa, 2011). Through numerous meetings, conferences and events, the XII help to improve the collaboration and coordination of efforts amongst the members of the consortium within constituency in a given country (Gray and Miller, 2009). One of the well-established XBRL constituencies of XII is based in the UK. Its role in the development of iXBRL will be explored in detail in this thesis. Prior to assessing the importance of XBRL UK, the context of the XBRL adoption in the UK will be discussed in the next section of the chapter

2.5 XBRL in the UK

Among the countries that currently use XBRL for filing business reports to governmental agencies is the UK. In April 2011 two of the governmental bodies in the UK, HMRC and CH, began using iXBRL for business and company tax filings (HMRC, 2018)

(Document16). HMRC mandated the usage of the standard for companies accounts and tax computations (CT600). Unlike prior XBRL filing programmes, the regulators in the UK developed a new XBRL-based digital reporting standard which they called Inline XBRL. iXBRL is based on XBRL functionality integrating XHTML (Extensible Hypertext Markup Language) format (HMRC, 2014) (Document15). XHTML is an extended XML mark-up language that mirrors Hypertext Markup Language (HTML) - the language in which web pages are rendered (displayed) (World Wide Web Consortium, 2002). The development of iXBRL is the central concern of this study due to the potential of this actor to bring change into the filing practice by incorporating XBRL tags into HTML-formatted document. iXBRL was developed and presented as a tool that would enhance the availability, cost effectiveness, and usefulness of business reporting by enabling the embedding of XBRL data within a human-readable file.

> *Inline XBRL enables the presentation of a report in normal, human-readable (X)HTML format, with XBRL tags embedded within it. The latter are not normally visible to a human reader, but can be displayed with suitable software when required. Preparers and consumers of reports can thus read the reports in the normal way but also check the scope and accuracy of tagging when required. Computer software can read the tags and process and analyse the XBRL data. (XBRL UK, 2015)*

As the important issues about iXBRL will be explored in detail further in this thesis, it is necessary to provide a brief outline of the development of the XBRL regulatory project in the UK. The key actions of the XBRL project can be identified on the project timeline in Figure 3. The events listed in Figure 3 allow the reader to follow the adoption of XBRL by the UK government that can broadly be divided into three stages: (I) implementation of XBRL; (II) development of iXBRL; and (III) implementation of iXBRL. Chapter 6 will discuss the commencement of the XBRL project in the UK (phase I). The antecedent

network of the implementation of XBRL (phase II) will be analysed in Chapter 7. Tracing the early pre-iXBRL development of the XBRL network in the UK will be analysed in this chapter. As this study is particularly interested in investigating the disconnect between expectations from XBRL and its capabilities and exploring the transition from XBRL to considering an alternative technology, the implementation of iXBRL (phase III) is out of the focus of this research. The events given in Figure 3 describing phase III reflect the consequent developments of the regulatory project to illustrate the importance of the emergence of iXBRL that was further mandated as the digital reporting standard for filing business accounts to HMRC and CH.

Figure 3: Timeline of Events of the Regulatory Project to Implement E-Filing Services

	Major Events of Regulatory Project to Implement E-Filing Services	Phase		Year
1	2000 In April 2000 HMRC introduced Filing-by-Internet (FBI) service in Self-Assessment tax filing.			2000
2	2001 Based on the weak progress of FBI facility, HMRC commenced the e-Service Development Programme. HMRC established Carter Agent Steering Group to meet with tax agents' representative members from different accounting representative bodies.			2001
3	2001 Initial start of developing the first draft of XBRL taxonomy that contained approximately 1,500 data elements, including the main financial statements and a range of accompanying notes.		Implementation of XBRL Phase I	2001
4	2002 January Proposal Review Workshop attended by representatives of ICAEW, and XBRL UK. The outcome of the workshop was the development of implementation plan comprising three stages. The plan introduced the idea of XBRL-enabled filing of businesses tax computations and company accounts that was to be developed over the period 2002-2006. HMRC commenced the project on improvement of the XML-based system and XBRL taxonomy detailing tagging techniques and defining the relationships of the tags.			2002
5	2002 April the Cabinet Office recommended the use of XBRL by UK government as part of UK E-government Interoperability Framework. The framework was developed by the Cabinet Office to ensure that an effective information flows across a range of governmental and public sector services. It included technical specifications and policies that covered that issues associated with data management, data integration, interoperability of platforms and system, and electronic access to the services. HMRC had a meeting with HM Treasury to secure the funding for XBRL project.			
6	2003 HMRC introduced online attachment to file supplementary documents to accompany CT600 tax returns. This initiative allowed tax agents to complete CT600 form, attach all supporting documents and submit it to HMRC via CT online application system. HMRC started considering options in relevance to the risk assessment techniques to enable processing of the case enquiries of large and complex business organisations. As a result, HMRC agreed to implement one structured format that could solve the issues with processing the information submitted in different formats by corporate filers.			2003
7	2002-2004 There were 10-11 workshops over the period 2002-2004 conducted by HMRC and CoreFiling discussing the CT6000 computation taxonomy.			2003
8	May 2004 XBRL UK published an initial XBRL UK GAAP taxonomy			2004
9	2004 ICAEW became the first UK professional body publishing the progress report on digital reporting in the UK. ACCA published report of supporting XBRL adoption to reduce compliance costs faced by small businesses.			

10	2005-2008 Development of the Joint Filing Facility of HMRC and CH (Companies House) recommended by the BIS (Department of Business, Industry and Skills) in its report "Better Regulation Simplification Plan".			2005
11	March 2006 Lord Carter published report recommending the introduction of the mandatory use of XBRL for filing businesses tax returns and computations (CT600) from April 2011.			2006
12	2006 Development of the view of the XBRL tax computation and live demonstration by CoreFiling of XBRL filing at the XBRL International Conference 2006. XBRL was tested and concerns were raised about difficulties in viewing the submitted data in a human-readable form.			
13	2007 XBRL UK started working on taxonomies conformant with UK GAAP, UK IFRS, UK Common data and HMRC CT600 computational for tax computations. In January 2007, XBRL UK released two taxonomies for a public review, UK GAAP and common data taxonomies.	Development of iXBRL Phase II		2007
14	2007 HMRC and a number of software vendors founded "Rendering Working Group" as a part of XBRL International consortium to develop capabilities to accommodate the data requirements of the tax accounts and computations. The first PWD (Public Working Draft) was published in July 2007 to sets out the requirements for a standardised method for the rendering of XBRL instance documents in human readable form.			
15	2008 HMRC cooperated with IT consultants and members of the Rendering Working Group to develop a human-readable form of XBRL.			2008
16	2008 CoreFiling and Rendering Working Group were working on the project 'Intelligent Financial Statement' of building XBRL inside PDF. The technology was tested and rejected by HMRC.			
17	HMRC together with IT consultants from Rendering Working Group were developing the concept of "micro-formats" when a number of XBRL data are put into HTML elements. The technology was tested and rejected at the initial stage of development.			
18	HMRC, CH, and CoreFiling were working on a single stylesheet technology based on XSLT (Extensible Stylesheet Language Transformations) - a language used to transform XML documents into other XML documents or other formats; e.g. HTML, plain text or XSL Formatting. After initial tests of this rendering mechanism, this option was rejected.			
19	HTML or XHTML (Extensible HTML) was selected as the main rendering technology to bind with XBRL. The new technology was branded Micro-XBRL, and subsequently changed the name into iXBRL			2009
20	2009 HMRC's CT online service became conformant with iXBRL specification. The regulation for submitting CT600 accounts and computation using iXBRL was approved. Companies House announced that the development of joint filing facility with BIS and HMRC was finalised and ready for use in April 2011.		Implementation of iXBRL Phase III	
21	2010 iXBRL joint facility was tested and launched. The usage of Inline XBRL for the submission of CT600 accounts and computations was legalised, and minimum tagging requirements to submit CT600 returns and accounts and computations in iXBRL format was issued.			2010

22	February 2011 Joint letter issued from Association of Accounting Technicians, ACCA, the Association of Taxation Technicians, the Chartered Institute of Taxation (CIOT), the ICAEW and the Institute of Chartered Accountants of Scotland to the HM Treasury about concerns of "imposing unacceptable burdens on business" by mandatory requirement of using iXBRL technology for submission of statutory accounts.			2011
23	April 2011 the UK companies were mandated to provide their annual accounts and CT600 returns and computations to HMRC in iXBRL format using two main taxonomies, a UK GAAP taxonomy and a UK IFRS taxonomy.			
24	2013 Ownership of the UK GAAP and UK IFRS taxonomies was transferred to the FRC (Financial Reporting Council - the regulatory body which sets accounting standards in the UK and Republic of Ireland).			2013
25	May 2014 FRC released for public review three new taxonomies to handle new accounting standard taking force in the UK and Ireland: (1) full IFRS for accounts under EU-adopted IFRS, (2) FRS 101 for the new FRS 101 accounting standard, (3) FRS 102 the new FRS 102 standard. The final versions were published in September 2014.			2014
26	HMRC has authorised and mandated the use of the new FRS 102 taxonomy for filings after 1 April 2015 which ended the period allowing the use of the minimum tagging set.			2016
27	The SEC announced a voluntary adoption programme to encourage public companies to use iXBRL for financial reporting			
28	ESMA initiates testing of iXBRL for the use as a European Single Electronic Format (ESEF) listed companies to file their annual financial reports. In March 2017 the SEC published a proposed rule Release No. 33-10323 that would mandate the use of iXBRL for financial reporting in the US.			2017

2.6 Chapter Summary

This chapter has placed the research within the context of a worldwide XBRL adoption. The first part of the chapter evaluates the XBRL functionality from the perspective of different groups of actors. Furthermore, the multiple roles of the XII were reviewed to introduce the governance of the setting of the XBRL adoption. As the motivation of this study is to explore the emergence of iXBRL, it is important to understand the current contextual setting of the adoption of the digital reporting standard in the UK. The timeline of the XBRL project in the UK was development and presented in this chapter. The fundamental differences between standards create tensions between different participants in the standard setting process (Hanseth, 2001; Suarez, 2005; Hemetsberger and Reinhardt, 2009). The next chapter will provide the governmental perspective on the XBRL adoption and review the main controversies of XBRL associated with interaction of multiple groups of actors.

Chapter 3 Literature Review

3.1 Introduction to the Chapter

Recent developments in digital reporting practices have resulted in growing research literature on digital reporting standards. The interest of academic and business communities is growing with the increasing adoption of XBRL by financial regulators in many countries including world's major economies like the USA, Australia, Japan, and the UK (Doolin and Troshani, 2007; Debreceny, Farewell and Piechocki, 2010; Troshani and Lymer, 2010; Mousa, 2011; Guilloux, Locke and Lowe, 2013). The existing research has identified challenges and benefits of the adoption of digital business reporting standards, and has particularly focused on the perspective of different actors related to the development and use of the technology. More recently, limited literature has emerged that offers new perspective on the future of digital business reporting arising from the development of iXBRL. The possible impact of iXBRL on financial information systems and financial reporting is yet to be explored. However, understanding the origin of iXBRL will contribute to the awareness of XBRL's strengths and weaknesses. By investigating XBRL affordances and constraints, this research will shine new light on the debates regarding the potential of XBRL to transform business reporting worldwide. This research aims at improving our understanding of the emergence of iXBRL through investigating its development and exploration of how it can 'come into being' (Latour, 2005).

3.2 XBRL as an element of e-government

A growing number of jurisdictions have adopted or are adopting XBRL for digital business reporting (XBRL International, 2018). With increasing XBRL adoption, more financial regulators are under pressure to standardise the dissemination of financial information by developing reporting regimes based on XBRL as part of electronic government (e-government) programmes (Mousa, 2011). Regulators as well as many other XBRL proponents expect it to bring an efficient and cost-effective solution to the main issues of the business data exchange between various groups of actors (Troshani and Lymer, 2010; Mousa, 2011; Guilloux, Locke and Lowe, 2013). E-government is used as a modern channel for formalising the communication between regulatory agencies and citizens (Frederickson, 2000; Cordella, 2007). It can be regarded as lying at the confluence of information systems and public governance (Heeks and Bailur, 2007). In the context of the provision of online services by the governmental agencies, e-government can be defined as the application of technology such as web-based regulatory services for delivering important governmental information (Brown and Brudney, 2003).

The adoption of e-government requires an integrative approach of the actors representing the governmental organisations to deliver their information and services as other heterogeneous entities interact and influence this process (Heeks, 2006). The e-government projects include collaboration between governmental entities, their business partners, multiple technological objects as well as the users of the services.

Previous research has shown that the complexity inherent to e-government programmes can restrict their progress with a number of challenges. Amongst them are the decision-making issues (Brown and Brudney, 2003), the effective use of the technologies (Gil-García and Pardo, 2005), the lack of relevant skills in the projects (Heeks and Davies,

1999), legislative constraints (Dawes and Nelson, 1995), privacy and security concerns (Ebrahim and Irani, 2005; Belanger and Hiller, 2006), resistance to new technology (Ebbers and Van Dijk, 2007), or restrictive capabilities of the information systems (Ramon Gil-Garcia, Chengalur-Smith and Duchessi, 2007). Many of the outlined issues require strong support and coordination from the governmental authorities to ensure the adoption of e-technology. As part of the modernisation of governmental e-services, governments initiate the use of the new technology to improve the regulatory operations and to reduce the regulatory burden. As a result, the governments give authority to regulators such as tax authorities and company register offices as well as innovative technology to become crucial elements of the e-government adoption (Mousa, 2011). In light of the capital market crisis of 2007-2008, the demand for better regulation and oversight of financial reporting has become one of the main priorities of financial regulatory authorities (UN DESA, 2010). The work on new technical policies to achieve interoperability and efficient data exchange coincided with the early developments of e-government in a number of jurisdictions. As a result of these developments, digital data standards used for communication and exchange of business information have become an important information system technology in the e-government framework. In the context of pressure on financial regulators to improve the regulation of companies and capital markets, one of the standards achieving dominance has been XBRL.

Overall, it can be seen in the literature that the XBRL integration in e-government infrastructure is likely to be a strong factor for the increasing adoption of XBRL (Mousa, 2011). When this research study analyses the role of digital business reporting standard in attracting or losing the support of the key actors, XBRL will be viewed as an important element of e-government. Furthermore, the research evidence presented in this section will help to explain the key motivation of certain groups of actors for transforming

business reporting in the UK, such as regulators seeking to reduce the cost of processing reports.

3.3 Regulatory Mandate

As a part of e-government infrastructure, the adoption of XBRL for online regulatory filing establishes a new relationship between regulators and other groups of actors such as software vendors, businesses, consumers of the data, and professional associations, and technology (Choi *et al.*, 2009; Mousa, 2011). A number of research studies have emphasised a critical role of regulators in the XBRL programmes through enabling legislative requirements for financial reporting in XBRL format (Troshani and Rao, 2007; Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013). In contrast to the expectations during the early development of XBRL, the main driving forces behind the XBRL adoption has been the power of governmental regulatory agencies (Locke and Lowe, 2007a; Troshani and Rao, 2007; Piechocki and Felden, 2009; Guilloux, Locke and Lowe, 2013). Regulators seek to promote the vision of XBRL as a data standard that will not only improve the regulation and surveillance, but will also reduce the cost of compliance of e-filing regulation by increasing the efficiency of communicating the data (Pinsker and Li, 2008; Troshani, Parker and Lymer, 2015). In particular, the main benefits of XBRL for regulators include a greater level of efficiency of the validation of submitted documents, ability to respond immediately to the identified submission issues and automation of the analysis of filed documents. The latter is associated with red flag identification and benchmark capabilities. In view of these benefits, regulators are free to direct the adoption of XBRL to achieve goals of advancing their e-filing programmes using XBRL. This regulatory power can be realised to the effect of mandate that has been recognised as one of the main factors facilitating adoption of XBRL (Pinsker, Gara and

Karim, 2005; Boritz and No, 2008; Debreceny *et al.*, 2011; Guilloux, Locke and Lowe, 2013; Troshani, Parker and Lymer, 2015).

3.4 Regulators as Taxonomy Developers

One major issue associated with the regulators' power to change the adoption of XBRL concerns their efforts in driving taxonomy development. As Chapter 2 has illustrated, taxonomy is an integral element of building the XBRL infrastructure. Taxonomies containing the list of tags inherently reflect semantic meaning of individual data concepts, in particular accounting concepts of financial reporting. Accounting taxonomies contain references to accounting standards and regulation (e.g. IFRS, UK GAAP (Generally Accepted Accounting Principles). Thus, accounting standards constitute the basis for the hierarchical classification of accounting concepts in taxonomies (Troshani and Doolin, 2007). One of the current challenges in the development of digital reporting technology is standardisation of taxonomies that can improve the interoperability of the data exchange on an international level (Troshani and Lymer, 2010). Creating and maintaining them at the level of depth and detail required for filers has proved to be a challenge for regulators (Troshani, Parker and Lymer, 2015; Locke, Rowbottom and Troshani, 2018). When adopting XBRL, regulatory authorities of the world's major economies such as the UK, the USA, Australia, and Singapore actively engage in developing local XBRL taxonomies (Debreceny, Farewell and Piechocki, 2010; Troshani and Lymer, 2010; Troshani, Parker and Lymer, 2015). This indicates the need to understand the motivation of regulators for selecting different approaches to developing and maintaining taxonomies and explore what interests drive them.

3.4.1 Taxonomy and Extensibility of XBRL

In the professional literature on XBRL (e.g. Bergeron, 2003; Binstock, Hoffman, Egmond, & Walenga, 2005; Charles Hoffman & Watson, 2010), one of the proclaimed benefits of XBRL is its extensibility – "the ability to add to the standard list of tags in order to accommodate unique circumstances in a filer's particular disclosures" (SEC 2009, p. 104). With extensibility and flexibility of an XBRL taxonomy being the key feature of the technology, XBRL allows regulators to decide the approach of imposing new rules and regulations to businesses (Pinsker and Li, 2008; Ramin and Reiman, 2013). Regulators can determine who extends taxonomy (regulators or filers) and the degree of extensibility (e.g. introduction of separate file extension, new tags entry). For instance, the U.S. Securities and Exchange Commission allow businesses to extend the US GAAP taxonomy in accordance with a fair presentation principle of information disclosure (SEC, 2005). This approach assumes that it is necessary to include certain elements in taxonomy that possibly may not be covered by legal regulations. Despite following the same Anglo-Saxon accounting model, the UK regulators chose a different approach when adopting iXBRL (Mousa, 2011). Technically, iXBRL does not make provision of taxonomy extension by allowing filers to submit reports in a human-readable format. This issue represents one of the central interests of this study. Previous studies of the XBRL project in the UK have not treated iXBRL in much detail to improve understanding of the key motivation of the UK regulators to develop taxonomies using this approach.

3.4.2 Taxonomy Regulation

So far, the literature had indicated that regulators have the power to affect standardisation of XBRL taxonomies (Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013; Troshani, Parker and Lymer, 2015) and thus change the standardisation of financial reporting on an international scale. Moreover, in the given circumstances the regulators' choice of approach to implement XBRL and develop taxonomies can be made in favour of their interests and needs. Thus, by addressing the pressure of achieving better regulatory surveillance and transparency of business reporting, regulators may choose to prioritise the aspects of reporting which they find important in the XBRL adoption. Their power to mandate the use of XBRL and set the main regulation for filing business reports can be illustrated by the research evidence that compares the voluntary and mandated adoption of XBRL. The limited research has shown significant difference in the speed of adoption between the national jurisdictions that mandated XBRL (Shan, Troshani and Richardson, 2015; Troshani, Parker and Lymer, 2015; Shan and Troshani, 2016) and countries with voluntary use of the XBRL standard (Doolin and Troshani, 2007; Troshani and Lymer, 2010). As a result of the approach to adopt the standard selected by regulators, XBRL taxonomies become an instrument of transforming and changing the regulatory reporting. This is consistent with the research evidence emphasising the compromise between taxonomies representing accounting standards and accurate codification of business reports which is reached and controlled by standard-setters (Troshani, Locke and Rowbottom, 2019). Until recently, there has been a limited number of research studies investigating this disconnect between what XBRL can do and what it is expected to do. This paper will attempt to fulfil this gap by exploring affordances of the XBRL-enabled filing in the UK and will seek to examine the significance of regulators and other

relevant actors in possibly building this disconnect and changing reporting practices by introducing iXBRL.

The next section of the chapter will review the limited literature on the UK setting of the XBRL adoption. The objectives of this part of the thesis is to open debates on the XBRL role in engaging other actors, including technology, into the transformation of business reporting. The purpose of this review is to examine the main issues and tensions that have already been researched and to determine how this research evidence can help in addressing the main research aims.

3.5 Controversial role of XBRL UK as the key standard setting group

Following the discussion of the importance of XII in the XBRL adoption, this section of the chapter will focus on the local national branch of the consortium – XBRL UK. Recent research of XBRL in the UK has suggested that support of the consortium through the formalisation and mandating of iXBRL was an important factor in the XBRL project in the UK (Mousa, 2011; Troshani, Parker and Lymer, 2015). The UK regulator - HMRC - was first introduced to XBRL during the conference in London organised by the consortium in 2001 where technical experts and consultants of HMRC became familiar with the technology and met its proponents (Mousa, 2011). This resulted in the issuance of e-government Interoperability Framework (e-GIF) recommendation status to XBRL as a possible technical solution for corporation tax reporting in the following year. When XBRL UK was formed, it provided a strong platform for enriching HMRC and CH's knowledge about XBRL benefits for the regulatory usage, in particular, it provided access to the first-hand information from the representatives of international regulatory bodies

who shared their experience of adopting XBRL (Mousa, 2011). In search of additional support, including but not limited to technical knowledge and expertise, HMRC became a member of the XBRL UK branch. HMRC attendance of international conferences and events facilitated building the relationship with other international adopters. As the literature has suggested, this helped to exchange information on numerous technical and legal issues associated with the complexity of XBRL adoption (Troshani, Parker and Lymer, 2015).

The research has shown that XBRL UK played an important role in gathering professional bodies for discussing the proposal aimed to improve the legal environment for the development of iXBRL and taxonomy for iXBRL-based filing (Mousa, 2011; Troshani, Parker and Lymer, 2015). XBRL UK's role was instrumental in developing and owning the UK GAAP taxonomy covering the main reporting requirements. In 2010 XBRL UK released the UK-IFRS taxonomy with additional data items for certain industry sections. The participation of Companies House in the events organised by the XII has also resulted in CH's strong interest in the capabilities of XBRL. Their early membership in the XBRL UK allowed gaining significant support of the European Registries for the XBRL implementation for their electronic filing project in the UK (Mousa, 2011).

3.5.1 Change in the XBRL adoption: Emergence of iXBRL

Despite the XBRL UK efforts to increase the awareness of the XBRL data standard and to coordinate multiple organisations to adopt XBRL in the UK, XBRL was not adopted for filing business reports to HMRC and Companies House in the UK. Few studies have looked at the reasons for introducing iXBRL (Mousa, 2011; Basoglu and Jr, 2015;

Alkhatib, Ojala, and Collis, 2019). One of the prominent papers exploring this issue is the study of institutionalisation of XBRL as accounting innovation in the UK by Troshani *et al.* (2015). The authors argued that XBRL has failed to achieve interpretability and plausibility (Ramiller and Swanson, 2003) and therefore failed to generate enough interest in the XBRL community. Specifically, the study found that the organising vision (Swanson and Ramiller, 1997a) of XBRL driven by XBRL UK did not reach the stage when the technology could become an unquestioned black-box innovation, whereas regulators succeeded to reach it and strengthen the XBRL legitimisation (Troshani, Parker and Lymer, 2015). It was the result of regulatory initiatives such as mandate that made iXBRL a taken for granted standard for the digital filing of business reports to regulators in the UK. Thus, by drawing on the UK XBRL project, the authors describe one way of collaboration between regulators and local XII branch and question whose interests and needs comes first when selecting the approach to adopt XBRL within the national jurisdiction.

In a detailed investigation of the unique UK context the study of Troshani *et al.* (2015) explores the interplay of relationship between the regulators and consortium. One of the issues that emerges from their research is concerned with the technicality of XBRL. Despite previous research demonstrating the successful adoption of a standard that is not always determined by its technical capabilities (Hanseth, 2001; Hemetsberger and Reinhardt, 2009), it plays an important role in the adoption process. XBRL UK focused a lot of its resources on developing the UK taxonomies and XBRL-enabled applications (Troshani, Parker and Lymer, 2015). Since the government, including HMRC and CH, contracted XBRL UK to maintain these developments, they prioritised the work over the key activities directed towards facilitating community awareness and interest in XBRL. These findings are consistent with the previous research evidence that suggests that

collaboration between standard setting bodies and consortia is complementary in the data standardisation process (Blind and Gauch, 2008) and the local national branches of XII play an important supporting role for regulators (Troshani and Rao, 2007; Debreceny *et al.*, 2010; Troshani and Lymer, 2010). This support may include technical expertise, educational and training resources, promoting general understanding and awareness of XBRL. For instance, XBRL Australia took a key position in standardising XBRL in Australia and provided substantial support for the leading force behind the project - the Standard Business Reporting Management Group established by the Australian government (Troshani and Lymer, 2010). Similar to the XBRL project in Australia, XBRL UK concentrated significant effort on the technical aspects of XBRL rather than attempts to improve the perception of XBRL by multiple groups of actors, including professional accounting associations, businesses, software vendors, and developers (Troshani, Parker and Lymer, 2015). It was argued that it was the imbalance towards the technicality of the project that contributed to a disconnect between filers of reports and XBRL UK and their allies (Troshani, Parker and Lymer, 2015). Similar findings have been reported by Guilloux *et al.*, (2013) in the study of regulators' adoption of XBRL in France.

It is important to note that the standardisation process requires a successful coordination of social and technical elements (Ole Hanseth *et al.*, 2006; Timmermans and Epstein, 2010). As Troshani *et al.* (2015) research has highlighted, the technical negotiations were prevalent within one site of the network of actors involved in the XBRL project in the UK. However, what can be observed is that XBRL is integrated in a network of other technologies such as taxonomy, accounting software products and other elements of technical infrastructure. These technical actors enable and challenge conditions under which XBRL can be used. Thus, building on the studies of XBRL such as the research of Troshani *et al.* (2015) and including the agency of relevant technology object can

potentially unfold new crucial developments of the network. For instance, the investigation of taxonomies that represent or exclude certain actors from the network and change the position of other technological objects can help to analyse the dynamics of the network in greater depth.

3.5.2 XBRL UK as coordinator of XBRL adoption

Another issue associated with the role of the consortium in the XBRL project in the UK is concerned with the purposeful engagement of all relevant groups of actors. The literature on the XBRL project in the UK has highlighted that one of the factors that affected the under-representation of some groups of actors was a membership fees model of the XBRL UK imposed by the XBRL International (Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013). The current model of the consortium membership creates a disincentive obstacle for new actors to enter the XBRL network (Troshani *et al.*, 2015). The proclaimed benefits of XBRL are not perceived as strong motivation for investing in obtaining access to mailing lists, educational material, and discounts on conferences and workshops that annual consortium membership provides (Baldwin, Brown and Trinkle, 2006; Troshani and Lymer, 2010). As the research demonstrated, these benefits and "first-mover" advantages (Pinsker and Li, 2008) communicated by XBRL UK were not perceived as valuable (Troshani, Parker and Lymer, 2015). This in turn undermined the role of XBRL UK in XBRL legitimization and contributed to a weak interest of businesses to join the XBRL UK (Troshani, Parker and Lymer, 2015). The number of organisational members of XBRL UK varied between 10-15 (XBRL International Inc., 2016). Under-representation of some groups of actors, whether they are businesses, accounting standards setters or software vendors, can lead to the interests

inscribed in the technology development being limited to the needs and motivation of the actors enrolled in the existing network. If some relevant groups of actors are not represented in the standard development process, perception of XBRL can be limited by the vision of the technology of those who are actively involved in the project (Ghani, Laswad and Tooley, 2009).

As can be seen from the literature, the role of XBRL UK has been essential in overseeing the XBRL development in the UK (Debreceny *et al.*, 2010; Troshani and Lymer, 2010; Troshani, Parker and Lymer, 2015). However, the existing accounts have also demonstrated a number of issues. Among them are the focus of efforts on taxonomy development, a limited membership of the consortium, the lack of resources, and weak engagement of the relevant actors that all lead to the weak input for developing XBRL and the slow delivery of the tasks undertaken by the XBRL UK (Troshani *et al.*, 2015). What is not yet clear is the impact of XBRL UK efforts to collaborate with regulators and to advocate the benefits of the XBRL reporting on the implementation of XBRL and consideration of the new standard. Although, research has been carried out on evaluation of the XBRL UK efforts (Troshani *et al.*, 2015; Mousa, 2011), much uncertainty exists concerning the XBRL failure in the UK and the role of XBRL UK in the process of developing the alternative. In addition, what we know about the role of XBRL UK is largely based upon studies that investigate how social actors form the networks. A major problem with this kind of research approach is that it omits the emerging tensions between different groups of actors and specific technological objects such as XBRL or XBRL taxonomy. This issue will be discussed in more detail in Chapter 4: Actor Network Theory.

3.6 Review of XBRL Affordances

The view that business reporting with XBRL is currently exposed to revolutionary changes leading to a greater level of efficiency, accuracy, and transparency is strongly supported within the XBRL community driven by the XBRL International consortium, its regional divisions, and regulators (Abdolmohammadi, Harris and Smith, 2002; Farewell, 2006; Engel *et al.*, 2008). The research literature demonstrates less unanimity on the vision of strengths and weaknesses of XBRL within the academic community. A number of studies attempted to evaluate the benefits of XBRL and its impact on financial markets. This section will review this literature to examine several controversial aspects of XBRL as well as explain which issues of the XBRL adoption will be explored further in this work.

In examining the background, interests, and needs of the key actors of this study, the explanation of the proclaimed purposes of the XBRL adoption worldwide needs to be included. In reviewing the literature on benefits of XBRL, it is necessary to understand the problems digital business reporting is expected to solve and how it is expected to act. In the regulatory context, one of the important goals of digital business reporting is to disseminate reports for the benefit of capital markets, in particular for the users of financial information, including private and organisational investors (XBRL International Inc., 2018). The primary motivation is to enable better decision making based on the use of financial statements data in the XBRL format to allow businesses, "to maintain dialogue with existing shareholders and potential investors…[that] can have a positive impact on a company's market value and cost of capital relative to its industry sector and the overall economic climate." (UK Investor Relations Society, 2003).

3.6.1 Communication Between Preparers and Users of XBRL Reports

Dissemination of business information can only be efficient when a user is capable of accurately and quickly finding the required information and processing it in an efficient manner (Debreceny and Gray, 2001; Lymer and Debreceny, 2003; Blankespoor, Miller and White, 2014; Efendi, Park and Smith, 2014). It is claimed that the XBRL-specific databases such as regulatory registry (e.g. SEC Electronic Data Gathering, Analysis, and Retrieval system (EDGAR), Companies House website) can provide the necessary platform (Debreceny and Gray, 2001). Digital business reporting is also anticipated to solve the problem of identifying elements of business information in the internet (Debreceny and Gray, 2001; Pinsker, 2003; Boritz and No, 2008). Apart from providing accessibility to the digital data, XBRL is expected to supply the users of the data with an efficient search-facilitating functionality (Locke, Lymer and Lowe, 2009). In particular, if the source of data is discovered, structure and classification of accounting data items should be clear and accurate for the data elements to be easily identified.

XBRL allows a structured and hierarchal representation of financial information based on the characteristics of an element; e.g. period, entity, and currency. XBRL data search functionality can help retrieving data items from any location of the financial electronic document, and tracking relations through taxonomy on how individual data elements are related to each other (Hodge, Kennedy and Maines, 2004; Janvrin and Mascha, 2010). However, even though XBRL has potential to change how users analyse reports by capturing the meaning of data they need, a number of research studies have illustrated that the search functionality is a more complex task that can involve an automatic so-called 'slice and dice' approach (Locke, Lymer and Lowe, 2009; Lowe, Locke and Lymer, 2012). When preparing data for sophisticated analysis, investors break down or 'slice' the

reports to individual data items which are then organised 'diced' in smaller reports customised according to their analytical goals. The experimental study of Locke *et al.* (2009) found that interactive data is not always the most efficient format for the in-depth data analysis. One of the issues is associated with comparability of data. While there is evidence that the automation of the data analysis can make the decision making more efficient, the process can also reduce the quality of analysis (Locke, Lymer and Lowe, 2009; Debreceny, Farewell and Piechocki, 2010; Blankespoor, Miller and White, 2014). The research has shown that the tags attached to data items standardise the information, but this standardisation does not necessarily imply the same semantic meaning behind the tagging. When data items are extracted from the reports individually, the lack of context and information about accounting policies can lead to the misjudgement of the tagged data, and therefore result in communication problem between preparers and users of reports (Locke, Lymer and Lowe, 2009). This limitation of XBRL poses an intractable problem for the analysis of financial statements and annual reports that are designed to be interpreted as a whole.

It is also important to consider that businesses may attach the wrong tag to the specific data item during the preparation of the XBRL reports. Some research papers have demonstrated that this is possible, yet the research was based on the evidence from the voluntary filing programme in the US (Boritz and No, 2008; Premuroso and Bhattacharya, 2008; Bonsón, Cortijo and Escobar, 2009). The filers may establish different arrangements to improve their filing practises if the filing in the XBRL format is mandatory (Troshani and Lymer, 2010; Kim, Lim and No, 2012; Yen and Wang, 2015; Troshani, Parker and Lymer, 2015; Shan and Troshani, 2016; Liu, Luo and Wang, 2017). For instance, Hsieh, Wang & Abdolmohammadi (2019) argue for a positive association of reporting efficiency and implementation of XBRL particularly in the XBRL mandatory

filing period. However, in addition to the inaccurate tagging mechanism, the lack of audit requirement in the SEC XBRL project can also contribute to the potential uncertainty regarding the quality of data. The current approaches to audit and assurance of XBRL data have been found to limit the confidence of the users in the submitted information (Boritz and No, 2008; Plumlee and Plumlee, 2008; Locke, Lymer and Lowe, 2009; Shan, Troshani and Richardson, 2015).

3.6.2 Comparability of Reports and Extensibility of Taxonomies

The XBRL literature has also suggested that another practical concern of the XBRL community associated with the comparability of XBRL data is the tension between the flexibility of XBRL and consistency of the reported data (Guilloux, Locke and Lowe, 2013; Dhole, Lobo, Mishra and Pal, 2015; Troshani, Locke and Rowbottom, 2019). XBRL is anticipated to provide a customised approach for electronic filing by providing the possibility of taxonomy extension (Cohen, 2004). However, since regulators have power to control the degree of extensibility of XBRL taxonomies in their jurisdictions when implementing the standard, flexibility of the preparers to add new tags during production of XBRL documents may not become regulators' priority. In this case, investors using the XBRL reports for analysis may not be aware of the data elements if they are not part of the standard taxonomy, and this undermines the initially claimed technological strength of XBRL (Lowe, Locke and Lymer, 2012; Blankespoor, Miller and White, 2014; Efendi, Park and Smith, 2014). Along with this effect, however, there is an affordance of XBRL to enhance the information value by allowing users to search for non-standard elements in order to identify what businesses consider is unique to them.

Some researchers have argued that comparability of reporting generally cannot be addressed by introduction of interactive data standards like XBRL (Lowe, Locke and Lymer, 2012; Blankespoor, Miller and White, 2014; Dhole, Lobo, Mishra and Pal, 2015). While there is evidence of the increasing accessibility of companies reports in digital formats (Rowbottom, Allam and Lymer, 2005), recent literature has explored the issue of the potential of digital reporting to capture complexity of reporting items (Troshani, Locke and Rowbottom, 2019). For instance, data aggregators providing business information online are known to standardise their data systems to a certain granularity level, regardless of the level of detail of the information businesses provide (Tallapally, Luehlfing and Motha, 2012; Boritz and No, 2013; Chychyla and Kogan, 2015). The users of data can develop more complex stylesheets (templates) to read and display the financial information (Farewell, 2006), yet the level of comparability is limited by the regulatory arrangements of a specific reporting regime. This is consistent with the findings of Blankespoor *et al.* (2014) that demonstrated the limited advantages of filing in XBRL format for large investors and adverse effect of it for small investors.

3.6.3 Critical Role of XBRL Affordances and Constraints

Overall, the previous literature has shown that affordances of XBRL have been repeatedly questioned. As one of the early missions of the XBRL projects was to establish a market driven demand for the XBRL data, the representation of investors in these projects has been the focus of many research studies. It was initially anticipated that investors would adopt XBRL on a voluntary basis to take advantage of the benefits of interactive data (Hoffman, Strand and NYAICPA, 2001). However, the research findings suggest that the XBRL capabilities can be limited as they are utilised by regulators during the projects to

implement XBRL (Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013; Troshani, Parker and Lymer, 2015), and it is the regulators' group who happen to act as the spokesperson for the "average investor" group (Lowe *et al.* 2012, p. 192). For instance, the image of investors during the SEC project in the US was carefully constructed using numerous arguments to justify the use of XBRL and to provide sufficient evidence for the need to build new reporting infrastructure (Lowe, Locke and Lymer, 2012). The SEC commissioners and XBRL US representatives made multiple statements on behalf of investors during the implementation of XBRL (SEC, 2012). As retail investors are not willing to be directly involved in the regulatory XBRL projects, their underrepresentation during the early stages of the project allowed the spokespersons to problematise the financial reporting project and helped to introduce XBRL as a solution (Lowe, Locke and Lymer, 2012).

The necessary condition for the reporting using digital data standard is its wide acceptance that will allow user and preparer communities to take advantage of a greater level of communication (Troshani and Doolin, 2007; XBRL International Inc., 2018). Yet the research evidence consistently demonstrates that it is regulators, not markets, who initiate the data standardisation in accounting contrary to the early expectations of the XBRL proponents (Troshani and Rao, 2007; Locke, Lymer and Lowe, 2009; Troshani and Lymer, 2010; Dunne *et al.*, 2013; Guilloux, Locke and Lowe, 2013). Previous research has shown that XBRL benefits have not been fully recognised by investors due to the weaknesses in analysis of the elements of data in the context and certain regulatory approaches seeking to balance flexibility and consistency of filing reports. The loss of comparability between XBRL reports added to the possibility of errors occurring undermines XBRL's benefits for investors and makes it an unappealing option for them.

As a result of the investors' lack of interest, their voice is excluded from the XBRL projects and businesses have less interest in voluntary adoption of XBRL.

As a result, it can be concluded that the foundation for the work on establishing a digital reporting technology for companies' filings is comprised of interests and needs of other groups of users such as regulators. It is the regulators and their allies that have the power to manipulate the perception of the capabilities of XBRL and highlight its specific affordances and constraints. It is clear the current reporting system based on XBRL-enabled technology is not capable to achieve the early claims without involving and engaging investors and analysts. The exclusion of the users who consume digital reports reduces the opportunity of the digital business reporting to improve communication of business information. This research evidence has important implications for developing this study. It positions the research within the regulatory setting and illustrates the mixed perception of XBRL affordances for the users of reports. While the effect of XBRL benefits on investors remains unclear, the leading forces within the process of standard setting are free to interpret the usefulness of XBRL in such a way that will benefit their goals. By determining what XBRL can achieve, regulators can interpret extensibility and other capabilities of XBRL to afford certain actions of other groups of actors according to their reporting needs. For instance, as the previous discussion has demonstrated, having control over taxonomy development can change comparability of XBRL data. This particular investigation of the motivation and interest of these leading groups of actors within the UK unique context will help to understand what is translated into digital business reporting and what motivated any changes in the XBRL technology such as development of iXBRL. Apart from Troshani *et al.* (2015), there is a general lack of research of transition from XBRL to iXBRL. By researching the affordances and constraints of XBRL, this study will explore what interrupted the relationships between

XBRL and the key actors in the project and how new relationship with the competing technology – iXBRL – was built. In an attempt to explain the mechanism and tensions shaping the XBRL-enabled digital financial reporting, this investigation will explore whose interests were prioritised when iXBRL was created in the UK.

3.6.4 XBRL Affordances and Constraints: Filers' Perspective

The perceived success of adoption of XBRL is largely determined by the scale of its use by businesses (Doolin and Troshani, 2007) who can adopt it as a simple bolt-on solution or embed it in their reporting systems. The research on the uptake of this technology by filers of business reports has addressed a number of issues influencing the international development of XBRL. Proponents of XBRL in the business world claim that it provides a number of benefits to preparers of XBRL reports (Abdolmohammadi, Harris and Smith, 2002; Willis *et al.*, 2003; Kernan, 2009; XBRL International Inc., 2018). In particular, XBRL is designed to reach a new level of automation and interoperability that can be realised when preparing reports within companies' organisational settings compared to other formats like PDF and HTML (Hoffman, Strand and NYAICPA, 2001). Moreover, filing XBRL reports to governmental agencies promises cost reduction and a more efficient data entry process for the preparers of reports (Baldwin, Brown and Trinkle, 2006; SEC, 2007; Janvrin and Mascha, 2010). An efficient data entry process is claimed to be reached by producing more reliable financial information for diverse groups of XBRL data users (Hoffman and Rodríguez, 2013).

The benefits of XBRL for filers are challenged by a number of experts and researchers providing evidence of tension between businesses and other groups of actors promoting financial reporting in the XBRL format (Debreceny *et al.*, 2005; Rowbottom, Allam and

Lymer, 2005; Troshani and Doolin, 2007; Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013). The impact of contradictory statements on advantages of XBRL and excessive praise of its potential strengths may result in early disappointment in its benefits for businesses (Locke and Lowe, 2007b). When companies take part in the data exchange process and file the reports to financial regulators, they may submit the tagged information without realising how its further processing can impact their businesses. The interaction of a filer with the technology can be minimal, yet the submission process is associated with significant costs for the filing entities (Pinsker and Li, 2008; Blankespoor, Miller and White, 2014; Ilias, Razak and Rahman, 2015; Alkhatib, Ojala and Collis, 2019). The perception of the advantages of XBRL in this case can be negative and so is the motivation to implement the technology (Pinsker and Li, 2008; Granlund, 2011).

Research has demonstrated the practicability of the use of XBRL for internal reporting (Blankespoor, 2019), however, it has not been extensively recognised by businesses (Debreceny, Farewell and Piechocki, 2010; Alkhatib, Ojala and Collis, 2019). Since interoperability of XBRL and efficient data exchange can be compromised by the customisation or flexibility of companies' filings to regulators (Scherr and Ditter, 2017), currently businesses have little interest in the exchange of reports in the XBRL format between their business partners or internal divisions (Cohen, 2009; Ilias, Razak and Rahman, 2015). The preceding discussion of the literature has shown that filers may have freedom to extend XBRL taxonomies. This is also concerned with the one of the key features of XBRL as an XML-based data standard – its extensibility. From the perspective of regulators, extensibility can serve as a tool for controlling the elements of reports. However, from the perspective of filers, the flexibility of the taxonomy offers the possibility of reporting a unique company's situation by creating new tags (Locke and Lowe, 2007b; Locke, Rowbottom and Troshani, 2018). At the same time, this flexibility

can limit the use of the external reporting filings for the internal reporting purposes due to lack of consistency of the taxonomy extensions developed by regulators and standard setters. Businesses can benefit from this capability of XBRL only if they are prepared to develop and maintain an internal taxonomy as part of adopting the XBRL Global Ledger Taxonomy Framework[3] (XBRL GL) (XBRL International Inc, 2018). Moreover, changes to the internal information systems such as Enterprise Resource Planning (ERP) or accounting software packages to enable reporting in the XBRL format for both groups of users - external (e.g. regulators) and internal actors (e.g. company's divisions) - are costly for businesses (Pinsker and Li, 2008; Blankespoor, 2019). This complex undertaking of implementing the XBRL GL (XBRL International Inc, 2018) allowing accounting systems to tag data at the transaction level requires significant investment of resources (Cohen, 2009), especially if the filers can observe a degree of uncertainty of the markets regarding the level of efficiency XBRL can offer (Ilias, Razak and Rahman, 2015).

As can be seen from the literature, XBRL fails to deliver the proclaimed benefits for filers who do not find it useful for their internal reporting. A number of research studies have shown that actors become disengaged if XBRL is problematised and fails to deliver its proclaimed benefits (Doolin and Troshani, 2007; Troshani and Lymer, 2010; Shan and Troshani, 2016). For this reason, the engagement of businesses in the network of actors supporting the adoption of XBRL is an important task for the leading groups of actors driving the XBRL adoption. During this process the role of the standard in meeting the

[3] The XBRL Global Ledger Taxonomy Framework (XBRL GL) was developed by the XBRL GL Working Group of XII to facilitate the use of XBRL for companies' transactional reporting. It is integrated into internal accounting and operational systems.

needs of businesses becomes central in XBRL projects. So far, however, there has been little discussion about how XBRL has achieved or failed to achieve this in the UK. Few writers have been able to explore the tensions between different groups of actors during the process of XBRL implementation in the UK (Troshani, Parker and Lymer, 2015; Alkhatib, Ojala, and Collis, 2019). However, the evidence for these relationships is inconclusive, as the role of XBRL in meeting the needs of businesses and other actors and changing their practices in the UK is not fully understood. This research seeks to give an account of the role of digital reporting standards in reflecting the interests of businesses and other group of actors. In particular, it will explore which XBRL affordances are attractive to the key actors and which constraints create the tension between the actors.

Extending the review of the literature on XBRL, this chapter continues to discuss important issues in the adoption of XBRL and explores the role of technological artefacts such as accounting software products and XBRL-enabled applications. Businesses' reluctance to use XBRL is also closely linked to the issues with the software applications used for preparing and processing XBRL reports (Chang and Jarvenpaa, 2005; Boritz and No, 2008; Troshani and Lymer, 2010). These issues will be reviewed in detail in the next section of the chapter.

3.7 Achieving XBRL potential through software applications and building alliances

There is an agreement in academic and professional literature that XBRL benefits cannot be achieved without the support of software vendors and developers (Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013; Troshani, Parker and Lymer, 2015). Human-computer interaction is a critical element of the communication between

preparers and consumers of XBRL reports. Preparers and users of XBRL reports do not interact with the standard directly, but engage with software platforms used for taxonomy editing, instance document creation, viewing, validation, analysis and other data processing tasks. These software packages have strengths and weaknesses that impact the users' perceptions of the capabilities of XBRL (Doolin and Troshani, 2007; Locke and Lowe, 2007b; Debreceny *et al.*, 2010).

Overall, there is evidence to indicate that there has been much more development of applications for generating instance documents rather than consuming and analysing them (Boritz and No, 2008; Dunne *et al.*, 2013; Joanne Locke, Lowe and Lymer, 2015). Boritz and No (2008) in their study examining the XBRL documents of the SEC's XBRL voluntary filing programme reviewed the available XBRL tools in the US market at the commencement of the programme. Out of 33 software vendors and consulting firms providing XBRL-enabled applications in 2007, most of them provided products for creating instance documents and working with taxonomies, and only a small proportion of them (5 companies) supplied analysis tools for XBRL.

Similarly, Dunne *et al.* (2013) in their study of diffusion of XBRL in the UK found a very weak engagement of the analysts, management consultants, and investors with the XBRL data. Many participants of the same study expressed considerably low confidence in the quality of XBRL filings published on their companies' websites and Companies House register systems. Interestingly, there was no indication that the digital data in the XBRL format was prepared, checked and published for the investors at any stage of the XBRL reporting by the companies participating in Dunne *et al.* (2013) research. Likewise, the study of Lowe, Locke and Lymer, (2012) has shown the lack of engagement of investors in the SEC's regulatory project. Whilst regulators are confident that a wider adoption of

XBRL by businesses will stimulate a higher supply and demand of XBRL analysis tools (SEC, 2007), the research evidence illustrates that the dialogue between investors and leading actors of the XBRL projects has not been established through the technical exchange of XBRL data.

A possible explanation for the lack of adequate XBRL-enabled analytical tools can be a central role of regulators who adopt and develop XBRL by excluding investors' community from the network. Even if investors are openly included in the negotiation of the development of the XBRL infrastructure, it has been found that they are represented by other actors such as regulators who fabricate their interests and act as their representatives or spokesperson (Callon, 1984; Law, 2002). As it has been concluded in the above section of this chapter, there was very week interest from regulators to consult investors about the development of XBRL-enabled filing systems and encourage software vendors to develop the suitable analytical tools (Lowe, Locke and Lymer, 2012). At the same time, there is a very weak interest in these tools at the investors' level. This issue has proved to be complex as there is also a problem in deciding whom to engage with as representative of investors (e.g. retail investors, institutional investors) (SEC, 2012).

In contrast to the analytical tools for XBRL, the software applications for generating instance documents have undergone a considerable development since the early stages of XBRL filing projects (Mousa, 2011). As software vendors develop applications for the filers to comply with the regulatory requirements to use digital reporting, their products constitute an important part of the XBRL projects. There are number of studies which focus on voluntary and mandatory adoption of XBRL standard for business-to-government reporting (Doolin and Troshani, 2007; Troshani and Rao, 2007; Boritz and No, 2008; Premuroso and Bhattacharya, 2008; Bonsón, Cortijo and Escobar, 2009). More

attention has focused on the groups of actors initiating and leading the XBRL adoption, including regulators and the XII consortium. However, there are relatively few studies that performed analysis of the software vendors' involvement in the adoption of XBRL for financial reporting (Troshani and Lymer, 2010; Lowe, Locke and Lymer, 2012; Troshani, Parker and Lymer, 2015). For instance, to determine the role of heterogeneous actors in attempts to standardise XBRL for financial reporting in Australia, Troshani and Lymer (2010) analysed how software vendors facilitated the production of XBRL documents. When XBRL was offered as a potential solution to the existing financial reporting problems by the Australian government, the benefits of XBRL were not recognised by the software developers. Some became members of XBRL Australia for the purpose of getting access to the XBRL expertise and getting advantage in preparation for the standardisation. However, the study has illustrated a limited number of the software companies joining the consortium, and a weak commitment of the actors who became members. However, as soon as the Australian Federal Government formally approved the Standard Business Reporting (SBR) programme and XBRL as a technical solution for SBR, software vendors found new interest in XBRL which was mainly commensurate with the demand for the XBRL generating software products. The expected requirement for business to file reports in the XBRL format actively mobilised developers to join the network and contribute to the XBRL adoption.

Similarly, Troshani, Parker and Lymer (2015) illustrated how regulators in the UK and their allies were actively seeking to promote XBRL amongst software vendors at the beginning of the XBRL project development. By drawing on the organising vision framework (Ramiller and Swanson, 2003), Troshani, Parker and Lymer (2015) have been able to show that regulators faced similar challenges in engaging and mobilising software developers and had to initiate strong measures to address the issue of the lack of interest

in XBRL. The interest of software vendors was significantly strengthened when a collective decision of HMRC, CH and their allies to mandate the use of XBRL was made. As a result, a wide range of commercial software packages integrating XBRL into the ERP systems and stand-alone XBRL products became available in the market (AccountingWeb, 2013).

However, in contrast to the USA, Australian and many other regulatory XBRL projects, prior to the decision to mandate the use of XBRL, the UK regulators made a detour and changed the XBRL-enabled reporting by commissioning the creation of a newly developed standard - Inline XBRL. Troshani, Parker and Lymer (2015) research has established that iXBRL helped regulators to fulfil their obligations to build the infrastructure for XRRL-enabled financial reporting, yet it is still not known how and why regulators succeeded to align the interests and needs of heterogeneous groups of actors and thus accomplish their established goals of implementing XBRL. This indicates a need to understand various factors influencing the development of iXBRL which have become countermeasures to an impending risk of failing to gain the required support for the project. The mechanisms that underpin the mobilisation of software developers and their actions to facilitate the adoption of digital reporting are only partially understood. Using the research evidence from previous studies, this study will seek to contribute beyond the existing research findings and explore the specific characteristics of iXBRL. While Troshani, Parker and Lymer (2015) mainly explore why XBRL has failed to meet interests and needs of different actors such as software vendors and businesses, this study will provide an in-depth analysis of the shift from XBRL to the pressure to create a new alternative.

3.8 Data Quality and the Role of Software Vendors

Another issue associated with the software vendors identified in the literature relates to the concerns about the data quality of XBRL filings (Debreceny, Farewell and Piechocki, 2010; Zhu and Wu, 2011; Vasarhelyi, Chan and Krahel, 2012; J Locke, Lowe and Lymer, 2015). Despite efforts of regulators to stimulate the growth of software markets and to develop collaboration between regulatory authorities, businesses, and software vendors, XBRL applications still suffer from producing error-prone XBRL reports (Boritz and No, 2008; Troshani, Parker and Lymer, 2015). The existing digital reporting mechanism in the XBRL format fails to eliminate flows and omissions, and produce high quality data (Troshani, Parker and Lymer, 2015). As extensive research of electronic government has shown, data quality problems is one of the central concerns for governmental agencies when they are required or require to use data for the analytical purposes (Kaplan *et al.*, 1998; Schwester, 2009). Data quality issues are mainly associated with inaccuracies, inconsistencies, and incompleteness of data (Redman, 1998). In the context of digital business reporting, inadequate filings deprive XBRL of its main benefits and challenge the fundamental concept of digital reporting to improve the existing practices of financial reporting.

There is relatively small body of literature that is concerned with the XBRL data quality. More attention has focused on the provision of taxonomy and its quality. An early example of research into this issue include the study of Bovee *et al.* (2002) investigating how taxonomy can accommodate the complexity of financial reporting. The study has paid little attention to the role of XBRL-enabled software applications. In another major study, a significant analysis and discussion on the impact of taxonomy over the data quality was presented by Piechocki and Felden (2009). The study researched the

development and maintenance of a number of taxonomies in national European jurisdictions and showed that extension taxonomies can contribute to the inconsistencies of data. In particular, taxonomies comprised of elements of national reporting requirements and the core elements provided by the overseeing financial governing bodies enabled enough flexibility for taxonomies to be adopted. However, the combination of those two elements has been found to have a negative impact on data quality in terms of incompatibility of some data items. Taxonomy design across different financial reporting systems can influence the XBRL data from instance documents.

Research to data has also determined how variety of errors in filings are linked to the conduct of assurance (Farewell and Pinsker, 2005; Boritz and No, 2008; Plumlee and Plumlee, 2008; Srivastava and Kogan, 2010). Thus, the literature investigating the data quality issues has focused on multiple aspects of business reporting in the XBRL format, yet those publications do not describe how data quality is changed by software applications. A relationship between XBRL financial reporting and software vendors remains rather speculative.

Up to now, research findings from several studies suggest businesses attempting to produce financial reports in their original formats using inadequate XBRL applications create further reluctance to the use of XBRL reports by data consumers (Chang and Jarvenpaa, 2005; Troshani, Parker and Lymer, 2015). At the same time, businesses reluctance to use XBRL is closely linked to the issues of intelligent software tools to prepare and process XBRL reports (Debreceny and Gray, 2001; Chang and Jarvenpaa, 2005; Boritz and No, 2008; Debreceny, Farewell and Piechocki, 2010). Pinsker and Li (2008) argue that even though XBRL is claimed to provide benefits for different actors including users of the data, it still does not encourage businesses to disclose financial

information in a more transparent way. The importance of the software vendors has been well recognised throughout in the literature on XBRL. What is less clear is the nature of this impact and how software vendors and their products can influence the development of XBRL affordances and constraints. Taken together, it can be concluded that XBRL affordances such as comparability and flexibility were attractive to the key actors enforcing its adoption (e.g. regulators, consortium), however, for XBRL to become operational in digital reporting practice it needs to attract other actors like software vendors. As data quality issues are closely linked to the XBRL processing and filing software products, without solving these issues XBRL will not be able to present the reports in the format suitable for other users of financial information. Providing additional detail of the relationship of XBRL and other actors will help to develop a better understanding of the XBRL potential and its limitations. For this reason, this research aims to examine the significance of iXBRL in creating new affordances and constraints of the digital business reporting that will shine new light on the debates about the main purposes of XBRL adoption.

3.9 Conclusion of the Chapter

The introduction and mandate of XBRL for financial reporting served as an impetus for a debate in the literature about the role of XBRL in transforming modern financial markets. Despite being perceived in the professional literature as an efficient and cost-effective tool for business information exchange, the academic research has illustrated that its increasing adoption has not always provided a high quality and wide spread solution for standardisation of business data exchange. Perception of usefulness and ease of use of technology does not always correspond with its active use (Ghani, Laswad and Tooley, 2009). Previous research has demonstrated that XBRL implementation can

inherit conflicts between implementers, users, and preparers of XBRL reports which indicates that long-simmering problems of dissemination of financial information have not been solved (Troshani and Rao, 2007; Debreceny *et al.*, 2010; Lowe, Locke and Lymer, 2012; Troshani, Parker and Lymer, 2015; Troshani, Locke and Rowbottom, 2019).

Complexity of the XBRL implementation for both filers and regulators in different regulatory jurisdictions is partly reflected in heterogeneity of actors involved in the programme. As the literature review has demonstrated, the key actors taking leading efforts in the XBRL adoption for financial reporting are regulatory authorities who actively engage in implementing XBRL and developing XBRL taxonomies. Considerable part of literature has been published on the role of regulators in the XBRL projects. These studies discuss their challenges, such as standardisation of taxonomies (Troshani and Lymer, 2010) and gaining support from other groups of actors. Similarly, it has been confirmed that the XII consortium initiates and is actively engaged in the adoption of XBRL (Troshani and Lymer, 2010; de Winne *et al.*, 2011; Guilloux, Locke and Lowe, 2013). Several studies attempted to evaluate their instrumental role in gathering professional bodies and individuals to orchestrate their resources for building the infrastructure for XBRL (Dunne *et al.*, 2009; Mousa, 2011; Guilloux, Locke and Lowe, 2013; Troshani, Parker and Lymer, 2015). Interestingly, despite the importance of investors and businesses, research into XBRL projects has found that there remains a paucity of evidence on the active involvement of these two groups of actors into the XBRL adoption. The research studies discussed in the chapter consistently demonstrate that it is regulators and their allies, not markets, who lead the adoption of XBRL (Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013). This is in turn contradictory to the early expectations from XBRL to solve the problems of interchangeability of business data. What we know about software vendors from numerous studies of XBRL is that

awareness of XBRL has been described as rather weak. This is particularly relevant to voluntary adoption of XBRL for financial reporting when software developers fail to recognise the expected benefits of XBRL (Mousa, 2011; Troshani, Parker and Lymer, 2015). Several lines of evidence suggest that a weak engagement of software vendors can influence the perception of XBRL by the users of the XBRL-enabled software applications (Debreceny, Farewell and Piechocki, 2010; Troshani, Parker and Lymer, 2015).

The literature on XBRL has highlighted several broad groups of actors who are treated as concerned with adoption of XBRL for financial reporting. Drawing on a limited range of publications, it can be concluded that one major issue with the professional and academic literature on XBRL is the confidence about XBRL's future potential and its role in improving financial reporting. To date, the evidence has demonstrated that XBRL does not meet the early expectations of its proponents. For instance, investors and other end users of the XBRL data have not been actively engaged in the XBRL implementation, they do not voluntary adopt it and are not interested in analysis and further processing of available XBRL data (Locke, Lymer and Lowe, 2009; Lowe, Locke and Lymer, 2012; Efendi, Park and Smith, 2014).

Similarly, it can be argued that regulatory XBRL projects suffer from limitations in the sense that the claimed advantages for the operation and function of a digital business reporting are not realised. There is no consensus among researchers and practitioners that XBRL is addressing the key aspects of financial reporting and can solve the major problems of accounting representation (Troshani, Locke and Rowbottom, 2019). The main motivations behind XBRL adoption by regulatory agencies remain speculative. This indicates a need to understand the complexity of the operation of XBRL by the same

groups of actors which could be explored by drawing on the example of the XBRL adoption in the UK. The response of leading actors to develop a new standard – iXBRL - is not yet understood. iXBRL is now a well-established standard that, "represents a change in technology, format, and use" (PwC, 2016). There has been no detailed investigation into the motivation of XBRL adopters to develop the new technology. Little is known about the emergence of it, and it is not clear what interests and needs have been inscribed in iXBRL.

The literature discussed in this chapter can be broadly divided into two categories: the studies encouraging further adoption and dissemination of XBRL, and the studies raising questions about XBRL capabilities. Drawing upon these two strands of research into XBRL, this study attempts to determine the extent to which iXBRL was designed to solve reporting issues of any group of actors involved in or concerned with digital business reporting. It has been demonstrated in this chapter some affordances were attractive to regulators (e.g. flexibility) as some of them could afford regulators to meet their needs yet constrained the actions of the consumers of the XBRL data such as investors and analysts (e.g. extensibility). The current level of comparability of XBRL reports associated with the data quality issues remains limited, but it suits the requirements of business filing to regulatory agencies. As previous research has shown, the key affordance of XBRL are closely linked to the development and maintenance of taxonomies. Taken together, while solving some issues, XBRL creates some tensions which have not been explored in detail within the UK context.

This thesis aims to unravel some of the setting to investigate the mechanisms that underpin the emergence of iXBRL. Thus, the main aim of the study is to investigate the development of iXBRL and to explore the setting of heterogeneous actors in which it was

designed. One purpose of this study is to assess the transition from XBRL to a newly emerged iXBRL. As iXBRL is gaining wider attention worldwide (XBRL International Inc, 2019), it is becoming difficult to ignore the uncertainty about the effect it can have on financial reporting systems that XBRL may not have brought (Basoglu and White, 2015). Thus, this thesis seeks to investigate how the associations between iXBRL and other actors have been built and how actors, including XBRL, taxonomies, regulators, consortium members, businesses and software vendors formed a network to create the new technology.

3.10 Chapter Summary

This chapter reviews academic literature on XBRL and the setting in which XBRL is adopted. Following the main aim of the study, the discussion of XBRL literature includes the introduction of the previous research of the adoption of XBRL and review of the XBRL affordances and constraints. The review of the previous research studies has illustrated that there is a disconnect between what XBRL is expected to do and what it is capable of doing. This chapter has examined the main tensions discussed in the literature and explored the reasons for them. This review was also aimed at assessing relevant developments in the XBRL projects worldwide and the role of the key actors enforcing its adoption. It has also been discovered that so far, there has been little discussion in the academic literature about the transition of the XBRL project in the UK from XBRL to iXBRL. The research to date has been presented in this chapter to illustrate the uncertainty about iXBRL role in interrupting the regulatory project to implement XBRL in the UK. In addition, the nature of the relationship between XBRL and iXBRL is not explored in much detail. This thesis seeks to address these research gaps by exploring the emergence of iXBRL. To identify the setting in which iXBRL has been developed, we

review the literature on XBRL as it is the antecedent standard linked to the origins of iXBRL. Finally, the concluding part of the chapter gives a brief summary of the review and presents a key area of interest of this study - the research of the development of iXBRL. To address the main research objective, the researcher integrates concepts from ANT adopted in this thesis. The theoretical stance of this study is explained in the following Chapter 4: Actor Network Theory.

Chapter 4 Actor Network Theory

4.1 Introduction to the Chapter

Having established the rationale for this research, this chapter provides a detailed account of the theoretical stance of the thesis and introduces a rich vocabulary of Actor Network Theory (ANT). The chapter begins by reviewing a number of prominent social science theories applied for the research of e-government and accounting information technology and evaluating them as alternatives to ANT. It will then go on to the theoretical dimensions of the research and look at how ANT can help to fulfil the main aim and objective of this study. Throughout this thesis, multiple ANT concepts will be used to theorise the development of iXBRL. For introducing these concepts, the chapter provides the definition and explanation of the key terms employed by the researcher. After considering the limitations and strengths of ANT, the chapter presents the discussion of the implications of the use of ANT for the research of technology.

4.2 Social Theories in Accounting and E-Government Research

4.2.1 Technological Determinism

Information Technology constitutes a major part of accounting activity. Software systems like Enterprise Resource Planning (ERP), online accounting and payroll platforms, digital business reporting languages such as XBRL play an important role in producing accounting and accounting practice. Initially, studies comprised of investigations of technology objects mainly assessed their effects on human action and human thought and viewed these as a basis for all human activity. Known as technological determinism, this

theoretical perspective offers the view that change in technology is the main reason for a change in society (Bimber, 1990; Smith and Marx, 1994). Once being a prevalent theory, it treated the technical and the social as two independent factors. According to the most common view of the theory, technologists who design and produce new technology work independently of the scientists who discover new scientific facts about the society (Woolgar, 1991). The technologists simply follow the scientific discoveries and turn them into new techniques and practices. This idea of technology causing social change has been challenged by many other subsequent research developments. As White (1978, p. 28) states: "a new device merely opens a door; it does not compel one to enter". New technology does not necessarily force society to adopt it and change the existing practices. A number of theories have challenged the technological determinism, emphasizing the complexity of the role of technology in our society and revealing technology as a social phenomenon.

4.2.2 Social Construction of Technology (SCOT)

Prominent opposition to technological determinism was developed within the works of Social Constructionists. It is one of the theories within the social constructivists' epistemology that was widely used in Science and Technology Studies (Pinch and Bijker, 1984; Woolgar, 1985; Bijker, Hughes and Pinch, 1987; Bijker, 1997). Originated as a response to technological determinism it conceptualises the role of human action in forming and shaping technology. It has been recognised that technology is a part of social context and, therefore, the research of the technical side of our society should focus on the stakeholders who define the characteristics and potential success of developing and adopting a technology. This theory has served as a popular methodological tool for many

studies analysing the causes of technological failures and successes (Boland and Day, 1982; Newman and Rosenberg, 1985; Hirschheim, Klein and Newman, 1991; Klein and Hirschheim, 1991). The theory allows exploration of how shared perception of a technology arise and impact its development and, in general, how technology interacts with society.

Winner (1993) criticized the theory of social construction of technology for a number of limitations. Amongst them are a narrow research focus that downplays the consequences of the implementation of technology, the role of technology in a broader social context including sociocultural, political, and economic factors that influence the social decisions about the technology development, and the role of different stakeholder groups affecting technology development indirectly. A particular concern of the use of SCOT theory for the current research project is associated with the limiting role of technology and specific focus on the interplay of human agency emphasised in the studies applying this theory (Markus and Robey, 1998; Bostrom, Gupta and Thomas, 2009). While focusing on the immediate interests, problems and solutions of different stakeholder groups that influence the development of technology, the SCOT theory disregards those who have no voice in the process. When researching how technology emerges, the social groups that affect the process sometimes fail to pass their judgements, interests and needs on to the way technology is interpreted. The social constructionists' view fails to account for those options (Winner 1993). Furthermore, Russell (1986) highlights that the SCOT theory provides researchers with "interpretative flexibility" (Russell, 1986, p. 343) which explains how social groups involved in the development of technology form their technological objectives. However, "we must recognize that the visibility of development and the point in the process at which each group can attempt to intervene, need explanation" (Russell, 1986, p. 343). In other words, there is, therefore, a definite need for not only explaining

the development of technology, but also illustrating how this process can change depending on objectives of different stakeholders, including groups that do not directly contribute to the construction of technology, yet are affected by it. As the SCOT theory fails to address the importance of the given issues, a natural progression of this research is to suggest a theory that will establish a greater degree of understanding of the development of iXBRL.

4.2.3 Structuration Theory of Giddens

Prior to examining the theoretical lenses that can be used to explore the technology as a social and socio-technical object, the review of the literature on the research of e-government and accounting technology has revealed that one sociological approach was widely used to research the potential of information technology one-governance (Van Veenstra, Janssen and Tan, 2010; Jacobs, 2012). The theoretical approach of Structuration theory of Giddens (1987, 1990, 1991) provides a different way of looking at organisational change that is claimed to be based on the concept of creation and reproduction of social systems. This theory is widely applied in the research of information systems and information communication technology focusing on the interaction of technology and social structures (Barley, 1986; Orlikowski and Robey, 1991; Orlikowski, 1992). Structuration is the process of production and reproduction of social structures in social life (Giddens, 1990). The theory offers the concept of the duality of structure stating that the structure or generally rules and resources is "both the medium and outcome of reproduction of practices" (Giddens, 1979, p. 5). Social structures contain agents performing social actions and, at the same time, they are the outcomes of the past actions of agents. In Giddens' theory, structure cannot exist without human action, as they enact

and make interpretation of it (Orlikowski and Robey, 1991). Technology as a part of the structures of human practice is not recognised as independent material artefacts creating social order, as structure does not have material characteristics. The theory of structuration as presented by Giddens (1990), did not address the role of technology in the social structure. However, a considerable number of subsequent works have been published on the effect of technology, in particular e-government (Van Veenstra, Janssen and Tan, 2010), on organisational structure (Orlikowski, 1992; Jones and Karsten, 2008). One of the examples of this research includes the work of Barley (1986) who treats technology as an essential part of human action and, therefore, of social structure. It is regarded as a social object in a social network of organisational structure. Orlikowski and Robey (1991) position information technology as a central part of the process of structuration. They recognise the duality of information technology:

> *This duality is expressed in its constituted nature - information technology is the social product of subjective human action within specific structural and cultural contexts - and its constitutive role - information technology is simultaneously an objective set of rules and resources involved in mediating (facilitating and constraining) human action and hence contributing to the creation, recreation, and transformation of these contexts (Orlikowski and Robey 1991, p. 3).*

Thus, information technology is recognised as a product, medium, and consequence of organisational action. Extending this approach, Orlikowski (1992) explored further the duality of technology and human action and proposed a new conceptualisation of technology and its central aspects: duality and interpretive flexibility.

> *Technology is physically constructed by actors working in a given social context, and technology is socially constructed by actors*

through the different meanings they attach to it and the various features they emphasize and use (Orlikowski, 1992, p. 406).

Similarly, DeSanctis and Poole (1994) developed an Adaptive Structuration Theory (AST) that criticised that techno centric view of technology use and proposes that "technology presents an array of social structures for possible use in interpersonal interaction" (p. 125).

The most important aspect of ST when applied to the research of technology, is that it helps to reveal how the rules and resources from information technology are brought into action, and thus provides significant insight into the social construction of technology (Orlikowski and Robey, 1991). If organisational change is the outcome of IT implementation, it is no longer viewed as a process of forces that a researcher can identify and explore. The ST helps to view it from a perspective of human action that gives meaning to technology. In e-government research, organisational change takes place as a result of changes in IT practices, and similarly IT implementation is affected by social structure through the ongoing process of human action (Van Veenstra, Janssen and Tan, 2010).

More recent attention has focused on the concept of duality corresponding to the initial Giddens' ideas of Structuration theory. In a number of recent studies, researchers emphasised that some research findings into the concept of duality have been inconsistent and contradictory to Giddens' ST (Jones, Orlikowski and Munir, 2004; Jones and Karsten, 2008). As a result, Jones, Orlikowski and Munir (2004) reconsidered some of the views on technology and human action and introduced a distinction between the terms 'technology as artefact' and 'technology in practice'.

However, one question that needs to be asked is whether technology is a only a social object. The key problem with the studies applying the ST is that they can overlook specific roles of technology in organisational change. The main criticism of ST is associated with

the strong focus on the social aspect of the interplay between technology and human action (A. Cordella & Shaikh, 2006). Though ST offers a sophisticated model for the research of technological and social systems, it does not provide the methodological tools for in-depth analysis of the development of material artefacts and the way they shape organisational action (Englund, Gerdin and Burns, 2011). This limitation of the ST will not take into account all of the linkages formed between humans and technological objects in the course of the development of a new technology, and, therefore, it becomes a major drawback in the research such the investigation of the emergence of iXBRL. A more appropriate theoretical approach is required to explore the complexity of the iXBRL development.

4.2.4 Institutional Theory

The issues of e-governance and development of new accounting technology have grown in importance in light of recent research that demonstrates that not only are they concerning technological innovation but also the construction and institutionalisation of certain social and organisational arrangements in support of existing and emergent power relations. One of the prominent theories challenging the technological determinism and linking technology to processes of institutionalisation within organisational settings is Institutional Theory. Institutional Theory highlighting the role of institutions in the social and political processes has been applied to a wide range of organisational studies, including research of e-government and accounting innovation (Ramiller and Swanson, 2003; Swanson and Ramiller, 1997; Tolbert, Mossberger and McNeal, 2008; Troshani *et al.*, 2015; Yang, 2003). The theory draws attention to institutions, and structures and mechanisms of social order governing the behaviours of individuals (DiMaggio and

Powell, 1983; Scapens, 1985; Scott, 1995; Barley and Tolbert, 1997). More recent attention has focused on what expectations of acceptable organisational practices exist and how organisations conform to them (Burns and Scapens, 2000).

Institutional Theory is a powerful analytical tool illustrating how social structures constrain and extend human agency in the process of institutionalisation of innovations. Previous research has established that it can serve as a strong tool for understanding contextual and institutional complexity of the development of a new technology (Ribeiro and Scapens, 2006; Scapens, 2006). However, the processes underlying the emergence of new technology cannot be fully explored without in-depth analysis of the roles of actors in a constantly changing complex setting. The focus a on 'top-down' approach recognising time lags offered by the theory neglects the possible effects of the responses of emerging actors such as material objects that can make the network more complex. Several studies applying Institutional Theory have been criticised for failing to explain the circumstances under which agents affect institutional change and analyse the opportunities that individuals and other actors have for enacting change (Seo and Creed, 2002; Hensmans, 2003). Dacin *et al.* (2002) have argued that new institutional sociology neglects intra-organisational factors and criticised it for dichotomising issues in terms of legitimacy and economics. It has been shown that Institutional Theory focuses on "convergent change" associated with new technology being diffused into an organisation (Quattrone and Hopper, 2006, p. 64). The Institutional theory's theoretical approach focuses on stability and inertia and overlooks how institutions play a role in dynamic developments. The theory views the actors related to the analysed phenomenon as delineated and stable structures. The stability of the pre-existing context that draws the agency which then causes an organisational change underpins research applying Institutional Theory (Caron and Turcotte, 2009; O'Neill, McDonald and Deegan, 2015). The theory accepts the

concept of pre-existing social structures and focuses on them as a central point for the analysis of action. This approach helps researchers to view the world as a hierarchy of these structures conditioning the human agency. Researchers applying Institutional Theory do not treat change in enough detail (Lounsbury, 2008). Most Institutional Theory-informed studies in the field of accounting have discussed change as an out of the ordinary event that is conditioned by the existing institutions (Battilana, Leca and Boxenbaum, 2009; Greenwood *et al.*, 2011). This particular conception of change as an outcome of relatively stable institutionalisation has been recognised as a key weaknesses by Institutional theorists (Lounsbury, 2008; Kaghan and Lounsbury, 2011; Zilber, 2013). The efforts to refine the theory have led to consider and favour other theoretical approaches that can help to produce an enquiry that captures the dynamics of the interaction between actors, organisations, and objects. Despite the strength of the Institutional Theory to reflect on the complex logics of organisations where actors are often faced with competing demands and objectives, its limitations mean that the research may not capture all the challenges of changing environment where new technology emerges. Thus, this study will require a theoretical tool that can help to view the change as a dynamic interaction of elements of social structures. The next section will explore the theoretical perspectives offered by the accounting literature.

4.3 Introducing Actor Network Theory

As with any body of research seeking to provide a comprehensive review into a particular research problem situated in the domain of accounting, the search for the most appropriate theoretical approach starts with a review of the existing theoretical perspectives. As it was determined in the previous sections of this chapter, this thesis requires a theory that will enable the researcher to explore the complex setting of the

emergence of a new technology. Building on the ideas of Institutional Theory and other social theories, accounting theorists have offered a dramatically different view of accounting in organisations and the role of technology within an organisational setting. One of the most prominent works that inspired the introduction of new theoretical concepts and ideas in the field of accounting was *Science in Action* of Latour (1987). This book challenges the once dominating social view that social context and technical content should be separated for understanding of any phenomenon and offers an analysis of science as the probes of building networks. By emphasising the concept of network, Latour (1987) has shifted the social focus from people to the complex settings of actants, including humans, technology, instruments and devices that all leave the traces in network. The thesis will further explore the main aspects of this theoretical perspective.

4.3.1 Socio-Technical Perspective

Socio-technical perspective highlights an important role of technology in structuring society (Knorr-Cetina, 1997). According to this view, social relations can no longer be seen only as a consequence of human interactions and are affected by technology and material objects. It has been suggested that the resulting solution, to incorporate the importance of material objects into social structures, can be used to extend the view of social relations to socio-technical interaction. On the one hand, technology such as hardware (laptop, mobile phones, and computers) as well as virtual objects (software and email) are the result of human design. However, a broader perspective has been adopted by proponents of socio-materiality who argue that it is the setting shaped by people that make the objects socio-technical (Latour, 1987; Law, 1999). Socio-technical objects both influence and are influenced by social relations and structures. Following the idea of socio-

materiality, it can be argued that researchers cannot understand how society works without exploring how technology affects individuals and organisations and how they shape human relationship (Latour, 1992; Suchman, 2007). As socio-technical actors are embedded in social arrangements, the interaction of the technology with other groups of actors such as users and the characteristics of social settings are both critical for understanding the development of innovation. All the actors are the mediators in a network and must be examined as such. This perspective allows tracing changes in the composition of the society by researching a complex setting that involves both human and non-human actors, material objects and people. In this research, digital reporting standards such as XBRL and iXBRL will be viewed as socio-technical objects.

4.3.2 ANT Development

One of the theoretical schools within post social theory is ANT. It originates in a belief that "the study of technology itself can be transformed into a sociological tool of analysis" (Callon, 1987, p.83). The main concept of the theory is a network of actants, including human and non-human actors, that form relations in varied social and work cultures (Callon, 1980; Latour, 1987, 1999). The role of objects is critical in the development and growth of the expert groups and cultures. ANT claims that technology and society are co-constructed. In other words, it offers a framework for exploring how a technical object come into being (Callon, 1984; Bijker, Hughes and Pinch, 1987; Latour, 1999). ANT allows researchers understand how actors secure their interests by shaping and strengthening alliances in networks. Walsham and Sahay (1999) argue that the "major focus of the ANT when applied in particular contexts is to try to trace and explain the

process whereby relatively stable networks of aligned interests are created and maintained, or alternatively to examine why such networks fail to establish themselves" (1999, p. 42).

4.3.3 Symmetry of the social and the technical

The ANT literature challenges the widely held view that the social and the material should be treated independently. The theory proposes that human and non-human actors have equal status, and that researchers must avoid giving priority to either the social - social and cultural influences - or the technical - non-human elements such as the physical characteristics of a technical object. It has been argued that this symmetry helps in the analysis of the mechanisms of a network formation (Hanseth and Monteiro, 1997). ANT does not define a priori the actants. According to Latour (1990), actants or nodes can be objects, people, settings, things and social collective which "enter into an alliance in order to satisfy their diverse aims" (Callon, Rip and Law, 1986, p. 16). Actants "hold the society together as a durable whole" (Latour, 1990, p. 103) and a network can be continually enacted and its processes can become reified. When employing ANT to examine a phenomenon, it is necessary to recognise that all networks are socio-technical, and no network consists of only humans or only technological artefacts. The symmetrical treatment between the technical and the social aspects of technology emphasises that social and technical actors are interconnected and are treated equally.

4.3.4 ANT in Accounting Literature

The main concepts of ANT have been widely used in the field of accounting. The early ANT-inspired accounting writers did not strictly follow the ideas introduced by Latour

and other ANT theorists. The ideas of explaining accounting systems at a broader historical and societal level introduced by Robson (1991, 1992) built the connection between accounting and its context through the sociology of science. The accounting techniques and their roles were viewed as the processes that cause change and create new forms of practices (Robson, 1991) whereas accounting systems were viewed as socio-technical objects of translation of the organisational environment (Robson, 1992). Other ANT-inspired works that had a significant impact on future accounting research include Miller (1990, 1991). These research works combined the neo-institutional (Rowlinson and Hassard, 2013) theoretical perspective with ANT ideas and highlighted the specific role of technology and its role in translation of people's ideas into accounting practice. Even though the concept of actor-network was not applied in these research works, the ideas of linking heterogeneous actors to explore the outcome of their relations was very close to the ANT conception of network. While Robson (1991, 1992) and Miller (1990) research focused on macro level, Chua (1995) case study of costing techniques puts heterogeneous organisational interests at centre place and focuses on micro level. This work has shown that an accounting system is part of a broader network that is strong enough to transform the perception of many organisations within the same sector (Chua, 1995).

Multiple research works applied similar theoretical frameworks and welcomed different ANT aspects into the accounting literature (Bloomfield and Vurdubakis, 1997; Edwards, Ezzamel and Robson, 1999; Briers and Chua, 2001). The issues of distance in space and time and control were examined by (Quattrone and Hopper, 2005). Challenging the concept of action at a distance applied in accounting literature, this work shows the fluidity and changing nature of technology. For example, one of the findings has indicated that the attachment to the examined ERP system constituted its identity. Furthermore,

the study illustrates that technology does not produce stable organisational practices, and the network can continually grow and challenge existing practices. Thus, the accounting research captures the continuous heterogeneity and fluidity that characterise the existing order which can be changed and moved in unpredictable directions (Quattrone and Hopper, 2001; Mouritsen, 2005). It is this aspect of technology that is very attractive for the current research of the development of iXBRL. It offers the opportunity to explore how the accounting phenomenon appears in the complex and contingent translation process. Moreover, some of ANT-informed implementation studies in the accounting literature have challenged the view of implementation as a particular stage that does include the design process. They demonstrated the changing and heterogenous nature of accounting practice that changes depending on the translated interest and needs of diverse groups of actors. This is the view this research utilises to explore the emergence of iXBRL. The study will follow the accounting technology in the making and trace back the processes within the network that influence its development.

4.4 ANT Conceptualisation and Terminology

ANT has been widely used to examine the construction of socio-technical objects that can be otherwise taken for granted. It provides the theoretical framing to explore the action of creating technological object and its feedback effect (Latour, 1992). The theory encourages researchers to trace how an object is designed out of human knowledge and also dependent on other technology objects, and how it incorporates with other actants' intentions and expectations for it to change (Latour, 1992). It proposes the view that technical objects constitute an embodiment of people's subjectivities, including their interests, intentions, and motives (Hughes, 1987). Much of the available ANT literature argues that technology has impact on human behaviour and therefore our lives can be

constrained and circumscribed by technology as a result of interaction between various actors in networks (Callon, 1984; Latour and Porter, 1996).

4.4.1 Sociology of Translation and Inscription

In an attempt to explain the process of formation of a socio-technical object ANT offers the concepts of inscription and translation (Callon, 1987). The application of these concepts has become an important device for exploring the development of new technology. In the process of entering the network of organisations, people, and other objects, and becoming a meaningful actor, a socio-technical object is developed and comes into being as a part of this network. The interconnections of actors causing the emergence of a particular technology object leads to further growth of the network of actors involved in the development of technology (Leonardi, 2009). This dynamic process leads to the expansion of knowledge through sharing across different groups (Latour, 1992). The expansion of knowledge between different communities forms the basis for the programmes of action needed to build enough support to be considered the best practice technique. According to (Orlikowski, 2007), a recognised programme of action leads to a specific socio-material enactments that forms forming the practice. Once the programme of action is designed, it is inscribed in the technology and thereby shapes it. As a result, technology becomes an actor-network itself that can change the programmes of action of other actors in the network such as the users of the technology. This process defined by the two key concepts of ANT - *translation* and *inscription* - constitutes the technological development. Inscription represents the process of incorporation of actors' interests into an artefact (Callon, 1987). The interest of an actor may affect the allowances and restrictions of the usage of an object which, in ANT, are described as *affordances.*

Inscription is the process of socialisation of an object and implementation of the designers' ideas on how they can realise the usage of an object (Callon, 1984). When researchers explore how actors form alliances and involve other actors including non-human objects to strengthen the alliance by supporting their interests (Lee and Oh, 2006), it is necessary to refer to the concept of translation or enrolling actors.

The broad use of the term translation is sometimes equated with a process comprising four moments: problematisation - the focal actor defines interests that others may share, establishing itself as indispensable, and determining the obligatory passage point through which all the actors in the network must pass; interessement - the focal actor convinces other actors; enrolment - other relevant actors accept the interests as they are defined by the focal actor; and mobilisation - the focal actor applies a set of methods to ensure that the other actors act according to their initial agreement (Callon, Rip and Law, 1986; Ramiller, 2005; Lee and Oh, 2006; Troshani and Lymer, 2010). The processes listed above help to illuminate the complex process of formation of a socio-technical object by examining the social-material interactions associated with innovation technology, particularly by identifying the interests the technical artefacts represent and inscribe. However, a major problem with this kind of application is the contradiction with one of the underlying ideas of ANT: that translation cannot be viewed as a process comprising stages or phases. In practice, these stages are synthesised and interwoven during translation (Mähring *et al.*, 2004). They can fail or commence at any moment of translation (Callon, 1984). One main advantage of the application of four moments of translation is the convenience of this concept for analysis and understanding of the complex process of technology development. For this reason, it was decided that the best method to adopt for this research was to use the four moment's concept and to apply it to reduce the

complexity of analysing data by adding structure to it. The researcher will not strictly follow the four moments of translation to negate the rigidity of structure of the analysis.

4.4.2 Programme of Action and Anti-Programme

One of the most significant ANT concepts that has been applied in the research of the development of a new technology is Latour's theorisation of the programme of action (Latour, 1992). Latour introduces the idea of a programme of action that represents a general term to describe a certain strategy and goal-oriented behaviour of actors to pursue the emergence of specific characteristics of technology in design (Latour, 1992). The view at the time, expressed in a number of prominent social science theories, suggests that characteristics of well-designed technology are intended to do nothing else but serve the users' goals. This idea was challenged by Latour. He proposed that this view of technological objects as "pliable and diligent slaves" (Latour, 1999, p. 31) arose from a set of common yet false beliefs that society and technology were two separate spheres. This important aspect of ANT to view the world as a socio-technical entity has been shown to be of value in placing particular emphasis on the nature of new technological developments.

It is argued that the programme of action is always opposed to an anti-programme which means that the initial motivation in the programme of action can be realised in a new programme that will then form a new objective for the actants (Latour, 1992). When in the process of translation, a number of actants' interests or intentions change, a *detour* takes place. Thus, the emergence of a new programme of action is the outcome of translation where human and artefacts can be both the subjects and objects of it. Programme of action is always opposed to anti-program, and, in practice, it is the "answer

to an anti-programme against which the mechanism braces itself" (Latour, 1992, p. 168). When the aim of the research is to explore development of a new technology, the researcher assumes that collectively human and non-human actors will constitute an assemblage of their interests translated into the desired programme of action (Locke and Lowe, 2007a; Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013). If the process of inscription explained above the expected outcomes and an anti-programme changes the use of the technology, the initial programme makes changes that cause detours (Latour, 1992). The tensions between the programme of action and anti-programme are of particular interest to the researcher, as it will help to illustrate how human actors and objects face and solve problems which arise during the process of new technology development and how the actors encourage new programmes which build the structure of the socio-technical world.

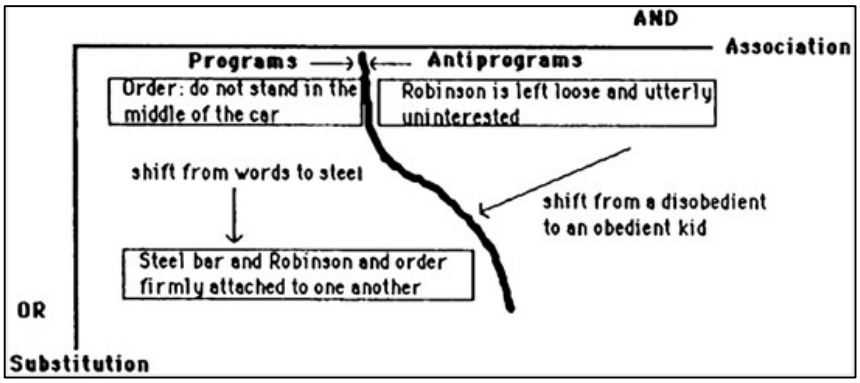
4.4.3 Translation Map

By drawing on the concept of the programme of action, ANT provides a methodological tool for researching in depth the nuances of the development of a socio-technological object such an iXBRL. As a theoretical framework, Latour's (1992) translation map can provide a strong research device for tracing the trajectory of the emergence of iXBRL by offering a useful way of incorporating the concepts of translation and programme of action into the research. It can help to demonstrate the broader tensions within development of digital business reporting standards and represent the trajectory of the standard battles (Guilloux, Locke and Lowe, 2013). In contrast to other theoretical frameworks employed for the research of adoption and development of technology discussed above, the translation map does not allow the researcher to take any interactions

of socio-technical actors for granted. In this study it is used to explore the development of iXBRL by avoiding any preconceptions concerning the actors and their role in the process of an emerging technological object (Lee and Hassard, 1999).

To understand the underlying idea of the translation map, it is necessary to review the Latour's (1992) work where the framework has been introduced. In that study, Latour (1992) describes an example of an everyday situation when a disobedient child stands in the middle of the family car. As Latour explains in this work, the situation leaves the child "loose and utterly uninterested" (Latour, 1992, p. 251). Under the pressure of an anti-programme to handle the situation, the parent has to fix a steel bar to keep the child restrained. This creates a detour or deviation in the initial development of the programme (Latour, 1992, p. 170). Figure 4 offers a schematic illustration of the situation as proposed by Latour (1992). The associations on the horizontal axis are the added elements - 'and' elements, while substitution axis represents replacing elements - 'or' elements. The trajectory of the programme of action is shown by a line demonstrating the translation of a group of actors aligning their interests and moving the line to the right, and, by doing so, the network extends and the line is moving down. As illustrated by the diagram, the process of moving to the right inevitably includes adding 'or' elements by moving downwards.

Figure 4: Translation Map (Latour, 1992)



The diagram is not intended to show solely how technology changes, neither is it employed to illustrate the setting of the technology use and its application. The main advantage of it is that it allows for 'keeping track' of any changes and helps to record the movements of the network undergone by actors. It provides an analytical tool that highlights the detours taken to translate the interests of actors into the programme of action. Following the objective of this thesis, to examine the development of the new digital standard, it will be necessary to identify and follow these changes and transformations by building the map of associations between actors. When examining an entangled assemblage of actors involved in the XBRL project in the UK, it is important to distinguish and isolate the relevant actors and trace how they formed a network. When this network has been built, its elements formed an association, a setting that led to the emergence of iXBRL. As suggested by Latour (1992), the initial mapping of the programmes and anti-programmes could lead the researcher in a vectored direction which can limit the value of the translation map. In an attempt to avoid prior interpretation of the research outcome, it has been decided to avoid the initial mapping of the programmes and anti-programmes prior to the interpretation of the research findings. Overall, the ANT concept of translation will help "to analyse the way in which actors form alliances and enrol other actors to support such alliances surrounding technology" (Lee and Oh,

2006, p. 177). With the same purpose in mind, the thesis seeks to adopt the concept of affordances which is discussed in the following section.

4.4.4 Affordances and Constraints of Technology

Derived from psychology research (Gibson, 1986; Hutchby, 2001; Leonardi and Barley, 2008; Markus and Silver, 2008; Leonardi, 2011a), the concept of affordance was introduced in ANT by Akrich and Latour (1992). The definition of an affordance given in that study states that an affordance is "a device that allows or forbids from the actors – human and nonhuman – that it anticipates; it is the morality of a setting both negative (what it prescribes) and positive (what it permits)" (Akrich and Latour, 1992, p. 261). To understand the evolution of the term, it is necessary to review the literature that explored its nature. In an attempt to explain how different objects provide support in their use, Gibson (1986) notes that this support does not only reflect the physical properties of an object but also provides specific affordances for action. It has been observed that these affordances are unique to different actors when they interact with the material objects, therefore materiality of the object can offer multiple affordances. Unlike Gibson (1986), Norman (1990, 1991) argues that affordances are built-in properties of an object, and its designers are more important for perceiving the object than the users of an object. In this view, affordances are stable and do not change in different contexts. By drawing on these two conceptions of affordances, Hutchby (2001) has been able to describe the relational character of affordances that are claimed to be constituted only in the process of people having contact with artefacts. According to this work, materiality of an object does not depend on people, but affordances do. Thus, they can disappear, change or become evident depending on the context of socio-material interaction. In this vein, affordances

can have multiple effects on the organisation of work (Fayard and Weeks, 2007; Zammuto *et al.*, 2007). In a study which set out to explore the imbrication of human and material agencies, Leonardi (2011b) argues that depending on the perception of technology's affordances, actors make choices whether affordances constrain or permit them to achieve their goals and act accordingly. The ability to recognise the interwoven agency of the material and the social is metaphorically described as imbrication (Taylor, 2007; Ciborra, 2009; Leonardi, 2011a).

> *Depending on whether they [people] perceive that a technology affords or constrains their goals, they make choices about how they will imbricate human and material agencies. Acting on the perceived affordances of a technology can then lead users to realize new intentions that could be achieved through these material features. The different ways in which human and material agencies are imbricated results in distinct outputs—either a new routine, or a new technology. (Leonardi, 2011, p. 154)*

This perspective is particularly interesting for this study as it has been adopted in order to demonstrate that in certain environments imbrication of human and material agencies produce organisational change which may result in a new technology. In his study, Leonardi (2011) notes when people have the ability to change their goal and alter their flexible routine or change flexible technology, they produce organisational change. However, whether a new routine or new technology is designed depends on the way material and human agency is imbricated. If an existing material agency is imbricated with a new human agency, people tend to change the routine, if a human agency is imbricated with a new material one – then a new technology can be produced. Depending on how the technology is perceived, whether it constrains or affords their aims, people decide how they imbricate human and material agencies. Thus, if an object is considered limiting, people would rather alter the technology than an organisational routine such as reporting

practice or work practice. If people fail to translate their needs into the network, they work around a constraint.

There are certain advantages of adopting the concept of affordances for exploring the interaction between technology, its users, designer, and other technological objects. It is used to help examine how the interests and needs of various heterogeneous actors are inscribed into the design and operation of technology as affordances. In this thesis, XBRL and iXBRL standards will be analysed as socio-technical objects with built in affordances prescribing, permitting or prohibiting certain actions.

4.5 Limitations of ANT - Managing controversies

Despite the fact that ANT offers a number of strong advantages for the research of an emerging technology, there are certain problems with the use of this theory. ANT helps to explore the socio-technical network of human and non-human actors; however, the research design of an ANT study can pose some difficulties when deciding the contours of the network. As Miller (1997) explains, "the territory of a project may not be limitless" and the researcher has to draw the boundaries and detect the critical nodes of the network that will address the research question. The practical limitations of a study using ANT, including physical and economic constraints, can restrict access to certain sites and actors, and thus affect the process of tracing the network. It has been decided that this research can commence with seeking to address these issues by following electronic traces (Quattrone and Hopper, 2006) and using readily available data on organisations websites. The research to date has demonstrated that using archival material can allow a researcher to follow actors effectively. However, it requires engaging in research before technology becomes taken for granted or black boxed (Latour, 1987) when the controversies surrounding it are still unsettled (Preston 1992). As the issues of the application of a

historical approach in an ANT study have been raised in ANT literature (Latour and Porter, 1996; Latour, 2005), the research design of this study will be adapted to these concerns by deploying methodology that will allow the use of key individuals who are still actively involved in adoption of iXBRL in various national jurisdictions as participants for the research study. Considering these ANT limitations, it is worth noting that the research question and research objective partially eliminate the challenges of limited scope of the project, and that a retrospective approach has been successfully adopted for multiple ANT studies of technology development. The issues of conducting research using ANT and entering the site of the controversy before it is settled will be further discussed in Chapter 5: Research Design and Methodology.

4.6 Chapter Conclusion and Summary

The chapter focuses on theoretical concepts which frame the research as well as discusses in detail the reasons for adopting ANT as the most appropriate theory for the research aims and objectives. The first section of the chapter reviews prominent social theories applied to study accounting technology and e-government, including the theory of Technological Determinism, Social Construction of Technology, Structuration Theory, and Institutional Theory. Each of them has strengths and weaknesses in capturing a complex process of technology development. In this review, it has been established that all of these theories provide approaches which help to gain important insight into how technology shapes, constrains, and enables organisational change. However, notwithstanding their strong position, these theories dwell strongly on the role of human agency in social transformations. The key implication of this is the possibility to overstate the effect of human action on the outcomes of the social structures. Considering all of the alternative approaches to ANT discussed in this chapter, it can be argued that an

overly strong preference for viewing technology as a material object within a stable environment poses a challenge in understanding the extent of the interwoven and constantly changing relationship between technology and organisational change. By employing the theories mentioned above, research findings can illuminate the role of humans in forming and shaping technology and view technology and any other phenomenon as the product of human intention. However, this study is interested in the tension between human and material agency, which can demonstrate how an organisational change is co-created by humans and objects. Considering the complexity of the development of digital business reporting standards explained in Chapter 2 and Chapter 3, the review of the literature has led the researcher to an interest in and consideration of ANT. By drawing on the socio-technical perspective, this chapter has also reviewed the early application of ANT concepts in accounting literature. The contribution of these theoretical developments is mainly associated with three major ANT aspects related to accounting studies: the application of the concept of network (Miller, 1990; Robson, 1991), prominence given to non-human actors, including accounting technology (Robson, 1992; Quattrone and Hopper, 2006), and the application of concepts of translation and inscription (Robson, 1991, 1992; Justesen and Mouritsen, 2011).

The next section of the chapter examined the theoretical underpinnings of the ANT and introduced specific theoretical concepts to frame this study. Amongst them are concepts of translation and inscription, programme of action, and affordance. The researcher discussed the concepts that can help to explore, disentangle and interfere in the socio-technical assemblages of the development of iXBRL. The theoretical ideas of ANT, r suggest that digital reporting standards should be viewed as socio-technical objects that constitute a complex combination of knowledge of different expert groups that form a network of heterogeneous actors such as regulators, consortium members, investors,

businesses, software vendors, software platforms, taxonomies and other relevant groups. By positioning the research within the ANT perspective, understanding digital reporting standard setting from an actor-network perspective can help us to understand how iXBRL emerged and explore the ways in which a variety of actors, each with their own interests and needs, work with and against each other in networks of alliances when following the programme of action. As actors are not always equally represented in the development of standards (Jakobs, Procter and Williams, 2001), this can result in dominance of representatives of one group of actors over others. The interests and goals of these groups of actors that have been inscribed in iXBRL created new affordances. ANT can help to understand the tensions between these groups and explore these affordances before iXBRL becomes black boxed.

To conclude, the aim of this chapter was to outline the broad theoretical framework and introduce central ideas and concepts of ANT applied for research in this study. The latter will form the theoretical basis for understanding the mechanisms and processes of the iXBRL development. Based on the theoretical underpinnings of the research presented in this chapter and the rationale explained in Chapter 2 and 3, the next chapter will introduce the research design for this study.

Chapter 5 Research Design and Methodology

5.1 Introduction to the Chapter

This chapter explains the choice of the research methods of data collection and data analysis guided by the following research questions:

Central Research Question: How did a new digital business reporting standard – Inline XBRL - emerge during the implementation of XBRL for filing reports of businesses to HMRC and Companies House in the UK?

Research sub-question 1: How did the formation of the network of actors to implement XBRL lead to the failure of XBRL in the regulatory programme of action?

Research sub-question 2: How did the network of actors affect the development of alternatives to XBRL and result in the emergence of iXBRL?

This chapter offers some important insights into the ontological and epistemological assumptions of the study. It is concerned with research design linking various methods of data collection and analysis. It is argued that qualitative methods allow to gather data to help address the research aim and objectives. The chapter will start with a discussion on the interpretative framework and qualitative approach selected for this research. It refers to the ANT-derived methodology to provide socio-technical insights and effectively investigate and answer the research questions. It then presents the data collection methods including interviews and documentary evidence and highlights the advantages and disadvantages of them over other methods. Additionally, the chapter includes the discussion on how the process of data collection was conducted and sample

of participants was determined. It will also discuss how access to participants was gained and data collection methods in detail. The chapter then focuses on the process of data transcription, the data analysis techniques and indicates how all these research methods were enacted and how the data were used within the ANT perspective. The ethical considerations that were taken into account in this study are summarised in final section. Finally, the chapter closes with Section 5.9 that gives a brief summary of the chapter.

5.2 Ontological and Epistemological Assumptions

Research studies can relate to different philosophical paradigms depending on philosophical assumptions and the view of some aspects of the world. One of the most significant philosophical debates concerns positions underlying the research design. Prior to determining the position of this research, it is necessary to concentrate on the terminology required for this argument. The view of the theorisation of data for this study is in agreement with Easterby-Smith (2012) who adapted Crotty's (1998) framework and provided the following definitions (Table 1).

Table 1: Hierarchy of Research (Easterby-Smith *et al.*, 2012)

Ontology	Philosophical assumptions about the nature of reality
Epistemology	General set of assumptions about the best ways of inquiring into the nature of the world.
Methodology	Combination of techniques used to enquire into a specific situation.
Methods	Individual techniques for data collection, analysis, etc.

The philosophical paradigm is based on the epistemological and ontological position that reflects the view of researcher(s) on some aspects of the world when conducting an inquiry. This position is central to the research study as it locates the research within one of the two main research schools – objectivism and subjectivism. Objectivism is based on the idea that reality is independent of human, whereas in contrast, subjectivism holds that all phenomena are the product of human interaction. Additionally, the philosophical stance guides the development of research design and the choice of research methods. In Chapter 4, it has been argued that ANT is considered the most appropriate theory to address the research question of the current research. To determine the methodological choices of an ANT research study, the following section will elaborate on ontological and epistemological views ANT relates to.

The status of reality, facts, and knowledge is an open discussion for researchers following the ideas of ANT. Traditionally, it has been argued that ANT relates to the relativist position that suggests that the scientific ideas and laws are not immutable and can gain the status of being 'true' after debates and discussion of scientists and researchers proposing them (Latour and Woolgar, 2013).

Similarly, Knorr-Cetina (1983) notes that certain theories can be accepted and black boxed under the influence of business and commercial resources. ANT recognises that some aspects of science can be real, however the main interest is in their interaction with humans, which can be observed by exploring the symmetry of agency. According to this view, ANT has a relativist epistemology, as it recognises the power of science to reveal hidden reality. It rejects the positivists' objectivity of the scientific knowledge, and it seeks to explore the reality of actors by allowing them to "define the world in their own terms" (Latour, 1999, p. 20). The knowledge and claims are not fully recognised as truth. This

principle lies behind the weak reflexive epistemology of ANT (Whittle and Spicer, 2008). It has also been argued that ANT relates to a relativist ontology (Lee and Hassard, 1999), as it seeks to explain the role of actors and their characteristics when observing the phenomena. The ANT unique approach suggests that the process of "following the scientists around" is essential in constructing the rule (Latour, 1987). This position assumes that "what counts for the truth can vary from place to place and from time to time" (Collins, 1983, p. 88).

5.3 Research Design

5.3.1 ANT as Methodology

The research design adopted for this study was informed by the research questions generated from the literature reviewed in Chapter 3 and the theoretical stance discussed in Chapter 4. The research questions are designed to guide the research in identifying the interpretations of actors involved in the development of iXBRL and to explore how the network was formed which resulted in the emergence of the new digital reporting standard. Based on the philosophical view that ANT uses, the current research accepts the methodology that is offered by ANT. Thus, the research seeks to elicit participants' experiences and identify the critical sites of the network in order to understand the needs and interests of the key groups of actors involved in the process. Multiple connections of the actors necessitate a nuanced and detailed understanding of the relationship between each actor and the network. The following section will discuss the methodology ANT followed by the introduction of the appropriate research methods selected by the researcher based on nature of the research topic and the theoretical underpinnings of ANT.

As various research paradigms are reflected in different methodological approaches (Griffith, 1999; Walsham and Sahay, 1999), researchers of technology in organisations adopt a wide range of methods that depend on the assumptions about the nature of technology and its role in our society (Orlikowski and Scott, 2008). The research of the technology from socio-material perspective applying ANT can offer different research design and methodologies (Berg, 1997; Hanseth and Monteiro, 1997; Walsham and Sahay, 1999). It has been argued, that assuming that people and technology only exist in relation to each other, the distinction of human and non-human actors is only analytical and relates solely to the empirical side of the research. ANT helps to examine how people and technology align their interests in order to reach their goals for implementing programme of action, thus the relations between actors become the central part of the research. For this purpose, the patterns and changes in the relationship within this socio-technical network should be identified and examined to identify the controversies in interests, values, and needs of actors. That is, the research should aim to detect and explore any possible tensions in the perceptions and views of different actors that change the network, deviate the programme of actions and accommodate the ideas for the technological change. Thus, with ANT, the collected data should be drawn from tracing networks and following actors and learning about their interpretations "without imposing on them an a priori definition of their world building capacities" (Latour, 1999, p. 20).

One of the main strengths of tracing the network concerns the possibility of unfolding "the invisible entities acting in hidden ways" (Latour, 2005, p. 49). It allows tracing the interaction of invisible things "If they make other things move, and you can document those moves, then they are visible" (Latour, 2005, p. 150). However, at the same time it can become a practically challenging task to reveal the invisible dynamics within the network at the in-depth level. This challenge is associated with identifying the actors that

"make a difference" (Latour, 2005, p. 153) and finding the unit of analysis (Suchman, 2007) using the network. Suchman (2007) also suggests that it is up to each individual researcher in designing their project to determine how large the examined part of the network is and how relevant certain actors are. The researcher must also place the units of analysis within a spatial and temporal setting of relations. For this reason, prior to the start of an empirical part of the research, the context of the development of iXBRL has been studied and the relevant actors identified.

5.3.2 Defining the context

Following this task, it is necessary to define the context of the development of iXBRL and position the current research within a time and space setting. The information that in 2011 major regulator - HMRC - mandated the use of iXBRL for business and company tax filing, positions the research in a unique UK setting and leads the researcher to begin the study from the early stages of a broader regulatory project to implement XBRL. The initial analysis of the publicly available documentation and review of the relevant literature has helped to identify some key groups of the actors prior to commencing the data collection process. In fact, the review of academic and professional XBRL literature in Chapter 3 has been framed around the discussion of these groups of actors which include regulators, XII consortium members, investors, businesses, and software vendors. The richness and complexity of the context has been introduced in advance of the empirical part of the research in order to integrate the research question, methodology, and strategies for the data collection and analysis. The research scope has been defined by the researcher at this stage of the project to abbreviate the analysis of possibly unlimited network of relevant actors.

5.3.3 Interpretative framework

The research will adopt an interpretative epistemology in order to understand the meanings that people give to the phenomena explored (Orlikowski and Baroudi, 1991). The interpretive research approach is guided by the theory that drives data collection, analysis and discussion of the main findings (Walsham, 1993). As was pointed out in the previous sections, ANT adopted for this research forms its methodological approach and therefore guides the empirical part of the study. ANT will be applied as a basic interpretative framework for data collection and analysis. According to Callon (1984), research design should be determined when the research is following actors. However, at the same time the choice of which actor to follow is framed around the limited knowledge of a network as well as time and other resources limitations. As suggested, practical examination of programmes of action and anti-programmes can ideally be performed as a part of a longitudinal ethnographic research project that can allow tracing all of the key actors. It is one of the methodological challenges of ANT. The lack of the description of various methods necessary to frame the research in a way that will allow richness and in-depth analysis can pose additional challenges for the researcher. Commenting on this criticism, Lee and Hassard (1999) argue that ANT is "ontologically relativist in that it allows that the world may be organized in many different ways, but also empirically realist in that it finds no insurmountable difficulty in producing descriptions of organizational processes" (1999, p. 392). Such view enables the researchers to analyse the relationships between collections of actors within actor-networks and describe these interactions without imposing any theory-based discriminations and boundaries. In so doing, the researcher can tackle the issue of unnecessary limits in analysing and interpreting the data.

5.4 Qualitative approach

The nature of the research project is exploratory based on qualitative evidence. The qualitative research approach employed will be helpful in uncovering the studied phenomenon due to aforementioned reasons.

The use of qualitative methods is a well-established approach in ANT studies (Walsham, 1997). It serves to understand the role of actors, their practices in the socio-technical context, and the associations they have built that led to the emergence of a new technology such as iXBRL. The main consideration that motivated qualitative research design of this study is its unique stenght in capturing human experiences in both spoken and written representations. In addition being qualitative research, this study can benefit from the ability to use multiple sources of data comfortably (Easterby-Smith, Thorpe and Jackson, 2012).

5.5 Data Collection Methods

Qualitative research can afford a number of research methods, including case study research, ethnography, qualitative interviews, and action research. While each has its advantages and drawbacks, ANT considers that a longitudinal ethnographic research project has a number of attractive features that help in the research of technology development (Justesen and Mouritsen, 2011). While ethnographic study can help the researcher to explore the details of the beliefs, attitudes and values of human society and specific cultures (Merriam & Tisdell, 2016), this research method usually requires long period in the field to allow the researcher to fully immerse in the site (Merriam & Tisdell, 2016; Yin, 2014). Due to the time and other research limitations, this study will seek to

observe the behavioural patterns of the actors and collect data to address the research questions with weaker engagement.

5.5.1 Challenges of Tracing the Network

In order to avoid taking the actors and their role in the process for granted, the choice of the relevant actors was based on the information available prior to the data collection as well as the knowledge gained during interviews at the early stage of the project (Data collection stage I). This permitted the researcher to discover, understand, and gain insights from potential participants of the study prior to evaluating their views on XBRL in the UK. Given the focus of the study on regulatory environment, the inclusion of the actors such as regulatory authorities, software vendors, developers, technology objects and businesses (filers) was necessary from the outset of the data collection. The researcher followed the actors involved in the development of iXBRL as far as practicable and identifiable. This helped to observe different perspectives which guided the analysis and interpretation of data.

One of the controversies of ANT the researcher had to deal with during data collection is the role of material objects that have agency and play an equal role to humans. "The missing masses" (Latour, 1992, p. 225) of the society are no longer denied by a group of social science researchers. In order to understand the role of technological artefact, Sayes (2014) offers (1) to recognise nonhumans and their agency in a human society, (2) to admit nonhumans' actions as mediators, (2) to recognise their membership in moral and political associations. Although, the list of possibilities to assert that nonhumans have agency is not limited by these actions, it is claimed to emphasise the understating of the methodology bracing the interlink between the social and the material (Sayes, 2014).

One of the challenging tasks of the empirical part of this research is associated with tracing technology and exploring the voice of the actors such as XBRL, iXBRL, XBRL taxonomies, HTML etc. The process started with the initial investigation of the socio-material context of the iXBRL development in the UK. The researcher participated in XII conferences to gain a first-hand experience and observe how the negotiation process of adopting XBRL was unfolding. She became familiar with the conference presentations and watched webinar videos and online tutorials on the use of iXBRL and XBRL. Additionally, she become acquainted with the front end of XBRL-enabled software at a user level and observed the accountant filing the tax reports using the HMRC website. These insights helped the researcher to gain a better understanding of the discussions of participants and interpret their view of the technology during data analysis.

It also helped the researcher to determine the boundaries of the network that are built based on the research question. As a result, the data collection process can be broadly divided into two stages: (i) Firstly, the research scope of the project has led the researcher to identifying actors that are stable in the network (e.g. XBRL, regulators); (ii) As tracing the network unfolded more associations between the actors, the researcher was able to determine the actors that left the network or de-stabilised it, but left their traces within the network. This information was used to recruit and observe more relevant actors of the project. In the next section of the chapter the researcher assesses a number of approaches and tools for collecting the data and discusses the two stages mentioned above.

5.5.2 Interviews and their structure

The current study focuses on understanding diverse groups of actors involved in the development of iXBRL. It must be noted that observing and immersing in the socio-technical setting of such groups would be challenging. As noted in Chapter 3, the study intends to undertake a challenging task covering regulatory adoption of the digital business reporting standard that occurred in the past. Therefore, it was decided that the best primary data collection method for this investigation was to interview individual found to be involved in the adoption of XBRL in the UK. In order to gain access to the key actors of the XBRL project, the researcher travelled to different sites to conduct interviews and engage with the relevant actors.

Interviews as a data collection tool can have various formats. This section will assess the advantages and disadvantages of different types of interviews. It will also justify researcher's choice of semi-structured interviews. The nature and the structure of interviews should be determined with the research question and research approach in mind (Jones, 1985). Depending on the level of structure, interviews can be broadly divided into three major categories:

1) Highly structured interviews

2) Semi-structured interviews

3) Unstructured interviews

It is one of the important methodological tasks of the researcher to decide how much structure to put into the interviews and how in-depth the conversation can be. Highly structured and formalised interviews may provide a great advantage in interviewing a large

population with fairly similar questions. The answers obtained can provide more standardisation of the data which can very useful and less time-consuming for data analysis. However, the drawbacks associated with the use of structured interviews include the lack of flexibility to clarify and extend the answers of respondents. Understanding issues from an interviewee's point of view can be difficult if there is no scope to discuss the details specific to the role and position of a participant. Moreover, it may be particularly challenging for the participants to discuss sensitive information if the researcher does not allow any room for this.

The unstructured interviews provide a greater level of confidentiality, as the conversation with the participants tend to be more personal in nature (Easterby-Smith, Thorpe and Jackson, 2012). A major problem with unstructured interviews is a practical task of covering the key topics relevant to the research question when the researcher has minimum control over the flow of the conversation. Considering the strengths and weaknesses of these two formats, a semi-structured approach was chosen to allow the researcher to initiate and steer the discussion following the research objectives of the study, yet, at the same time, to enable interviewees to share their experience in a less structured conversation.

5.5.3 Limitations of Data Collection Sources

One of the issues with semi-structured interviews is the avoidance of personal bias and influence on interviewees' responses. As suggested by Davies (2000), in an attempt to make each interviewee feel as comfortable as possible, it is necessary for the interviewer to understand that the "most important is to listen, then prompt and encourage when appropriate without 'leading', and to steer the discussion back on track if it appears to be

heading down a less promising avenue" (2000, p. 91). The second issue with face-to-face semi-structured interviews (Shank, 2006) is linked to the practical aspects such as finite financial resources, an appropriate location, and time available for conducting them. The researcher adapted the process of data collection according to these considerations. Taken together, this study determined that semi-structured interviews would enable the researcher to ask probing questions to the key actors engaged in iXBRL development to gain insight into the XBRL regulators' project to implement XBRL and, by this, help the researcher to collect the relevant data to identify the key tensions in the relations of actors associated with the emergence of iXBRL.

Semi-structured interviews were conducted with the intention of identifying how the key actors within the XBRL community in the UK interpret the development of iXBRL. The researcher organised face-to-face interviews due to the flexibility they offered in gaining an in-depth understanding of new leads, exploring new facets of phenomena as well as gaining a good understanding of interviewees' accounts of their experiences in the XBRL project (Shank, 2006; Easterby-Smith, Thorpe and Jackson, 2012). In total, 34 semi-structured interviews were conducted with individuals (see Appendix 6). Easterby-Smith, Thorpe and Jackson (2012) suggest that in 'one-off' interviews it can be difficult to obtain trust as the respondents and the interviewer do not have any previous experience of communicating and sharing the views on certain topics. To overcome this difficulty, the researcher can present her research topic to an interviewee in a professional and enthusiastic way. Additionally, a written rationale and background information were provided to potential participants to familiarise them with the research project,

5.5.4 Gaining Data Access

Each of the interviews lasted from 34 to 94 minutes (see Appendix 6) with an average time of 61 minutes per interview. In all, 34 hours and 49 minutes of interviews were recorded, transcribed and analysed. The recorded interviews were transcribed by a third party – a specialised company - according to the transcription guidelines developed by the researcher (see Appendix 7). The duration of the interviews reflected the fact that some participants had heavier involvement in the development of iXBRL, and thus, had more information to share with the researcher. For instance, the interviewee with code name SoftVen7 who was involved in the technical development of iXBRL lasted 86 minutes. On the other hand, the interview with Consort4 lasted 34 minutes and their involvement in the XBRL project in the UK was limited. One participant was interviewed twice due to his active participation in the technical development of iXBRL in the UK.

Most of the interviews were recorded to ensure a clear understanding of the respondents' answers. It also allowed the researcher to return to the recorded interviews and reflect on the level of personal bias and influence of the researcher on interviewee's answers during the conversation. Moreover, recording of interviews allowed to establish the definition of some technical terms and abbreviations heavily used by a number of participants due to the specificity of the studied technology. In addition, handwritten notes were made to supplement the transcriptions.

As expected, semi-structured interviews offered an effective way to structure the interviews, particularly the first interview, that was essential for defining the key topics to guide the further conversations with participants. Although the interviewer sought to cover the pre-defined topic areas, the aim was to allow the interesting insights to emerge during each interview (Hammersley and Atkinson, 2007). In order to maximise the use of

this data collection method, the researcher adopted a personalised approach to interviewing, where each participant's profile was studied before the interviews took place. The interview structure was designed and adjusted according to each individual participant's role in the XBRL project in the UK. The general format of the interview schedule was developed to elicit information around three broad areas (see Appendix 5) as shown in the list below:

1. Role and position of an interviewee in the XBRL project in the UK
2. Relationship between heterogeneous actors in the network
3. Development of iXBRL

The interview questions have not necessarily aligned directly to the interview schedule, as there was an intention to guide questions concerning topics that were more interesting from participants' answers to any preceding questions. All interviews began with an introduction of the researcher's profile and the reasons for conducting an interview, and then the interviewee was given a copy of the research consent form where an informed consent and permission to tape-record the interview was presented (see Appendix 2 and 3).

Easterby-Smith *et al.* (2012) suggest the following three elements to improve the results of the interview data collection method which the researcher consistently worked on: (i) building trust with interviewees by assuring them that the interview data shall not be misused, and are used solely for academic purposes; (ii) use of simple language free of any theoretical jargon or for some interviewees technical concepts during the interviews; (iii) interviewees were given an opportunity to choose their preferred interview location. 19 interviews were conducted in the offices of the participants, 8 interviewees preferred a

neutral setting and chose a public place not far from the location of the work offices, two participants chose to be interviewed at the Open University, and four interviews were conducted over the telephone due to unavailability of the participants to meet in person. Before contacting participants involved in the adoption of XBRL in the UK, an ethical clearance was received from the Open University. The documents presenting the research objectives and open-ended semi-structured questionnaire were provided to all participants before interviewing to ensure they feel comfortable expressing their views (Flick, 2002). The ethical clearance confirmation was available upon request.

5.5.5 Documentary evidence and its limitations

This study has started with collecting documentary evidence of the iXBRL development. Documentation has been analysed to provide the contextual setting of the research problem and to increase the reliability of data analysis. These data have been collected from publicly available documents available on the websites of organisations found to have been involved in the XBRL project in the UK. Documentary evidence has been used to inform the researcher about the setting of the emergence of iXBRL, and help to build and stimulate more analytic ideas when interpreting the data. Documents have been analysed as traces of the associations between actors within the network in which interests and needs of the actors were inscribed.

The semi-structured interviews have provided in-depth information about the complexities and challenges which actors faced, and the documentary evidence supplements the primary data. These data consist of documentation such as publications, recommendations, reports, directives, and other material available on the websites and in archives. The full list of documentation selected for the data analysis is presented in

Appendix 8. The documentation selected for the further analysis was coded, and the codes are included in the chapter of the thesis presenting findings of the analysis. As a result, the data corpus within the research comprises transcripts of interviews and downloadable background information collected from companies' reports and websites.

It is important to explain how documentation has been used as a data source and what limitations it may have. Silverman (2000) argues that there are few safeguards for the researcher to help avoiding picking documentary evidence out of the data set to support some statements of the interviewees. As this could influence the quality of the data analysis, the researcher is committed eliminating this bias by following several principles of working with documentation. The *refutability* principle allows to search for the contrasting positions that may undermine certain perceptions of the actors or particular statements in a document (Silverman 2000). *Constant comparison* conforming with grounded theory approach encourages the research to 'stretch' the research into some other settings and cases (Silverman 2000). This task can be difficult within the time frame of a PhD project, however, exposing the data to different setting is helpful in receiving consistent comparison results. The researcher looked at the setting of adoption of other digital reporting standards when analysing the documentation. *Comprehensive data treatment* involving analysis of data at the early stages of the data collection helped to collate different documentary evidence and add a degree of validity (Silverman 2000). This has been reflected in two consequent stages of the data collection process discussed in Section 5.5.1. These principles were particularly important in verifying documentary evidence and interview data and building confidence in the final conclusions.

5.6 Voice of Technology

Collection of documentary evidence is a useful method where researchers seek to gain in-depth and first-hand accounts about technological practices of the actors within the network. This is because such evidence reflects rich detail about allies and supporters of the technology. This permits closer engagement with the technology under investigation through direct observation of the socio-technical practices. Accordingly, the researcher is able to discover the voice of technology which may not have been earlier envisaged.

Overall, tracing technical actors and their role in the development of iXBRL was performed through interviewing the spokespersons (Callon, 1984; Wagner, Galliers and Scott, 2004), reviewing available technical documentation (e.g. technical recommendations, meeting notes etc.), and observing what technology does, so its voice can be heard (Callon and Latour, 1981; Pels, 1996; Wagner, Galliers and Scott, 2004). Relevant technical documentation discussing the specifications of taxonomies and implementation of XBRL by UK regulators provides the basis for identifying the key technology actors. The latter can vary as much as social actors and can belong to different groups (reporting standards, analysis tools and platforms, taxonomies etc.) (Latour, 1987). Publicly available official documentation has been collected for analysis and includes meeting notes, presentation slides, comments, directives, and specifications. In addition, there were four pieces of confidential documentation that were provided by participants in response to the follow-up email after the interviews. The full list of documentation is available in Appendix 8.

5.7 Richness of Data

Documentary evidence has also offered an effective way of identifying the key individuals and technological actors involved in the XBRL filing project in the UK. Prior to the commencement of interviews, the review of the selected documentation has been performed for developing the initial list of participants of 18 individuals who can be allocated into the following broad groups:

- Regulatory agencies: HMRC, Companies House, FRC
- XBRL UK and XII members
- Professional accounting bodies: ICAEW, ACCA, ICAS, CIOT
- Software Vendors, members of Business Application Software Developers' Association (BASDA)
- Consulting firms (KPMG, PwC)

Identifying and distinguishing these groups of actors constituted a core part of selecting the actors for the data collection process. The list of participants has been extended through analysis of the interview data that had already been available for the researcher after the initial interviews. Thus, most of the interviewees were recruited with the help of individuals who had already taken part in the research. As the XBRL community in the UK is relatively small, selection of participants through the analysis of documentation and information provided by the interviewees helped to answer the practical issues that researcher encountered in carrying out the work on getting access to the participants. As a result of the analysis of the relevant information, in total 48 individuals were contacted directly (see Appendix 1) and 33 were interviewed for the study (see Appendix 5).

Participants were recruited from 19 organisations found to be relevant to the development of iXBRL. 15 individuals of those contacted either declined or failed to respond to the request to participate. It can be suggested, that a failure to receive replies to the outgoing emails may have been caused by messages delivered to unmonitored mail boxes or a conscious decision not to participate in the study. Contrary to expectations, the level of engagement from prospective participants in the business sector filing iXBRL reports on a regular basis was substantially lower than the response of individuals from other organisations. This can be interpreted as an indication of a weak interest in iXBRL generated amongst filers. The researcher believes that a sample size of 33 participants met the objective to trace the key sites of the network and was sufficient to achieve the objectives of the research.

5.8 Performing Data Analysis

The rich data collected for this study has been analysed on interpretative basis (Walsham, 1993, 1995a, 1995b). This approach is concerned with researchers, "interpreting their interpretations of other people's interpretations" (Walsham, 1993, p. 78). This approach will help the research to avoid preconceptions and generate an understanding of the associations between the actors (Orlikowski, 1993) by following the key ideas of Actor Network Theory enhancing our understanding of the unfolding action (Latour, 2005). This analysis strategy is open-ended and exploratory in nature (Hammersley and Atkinson, 2007).

An initial analysis of the data started while the data collection was running and ended when the work of the PhD thesis was finalised. The selected data analysis method comprised examining, categorising, testing, tabulating, and combining research evidence to draw empirically based conclusions (Yin, 2016). As a result, findings that emerged from

analysis of the data of 34 interviews and documentation were used to draw empirically based conclusions. The interview transcriptions and the selected documents were imported into qualitative data analysis software - NVivo. The analysis technique in NVivo included the repeated use of codes of different size and quality. Some of the codes were represented by a sentence, and some of them were of length of one paragraph of the interview transcription or professional document. A major part of the imported data was coded multiple times with different codes as the same data could cover a range of themes. The number of codes assigned to the same text was not limited. The highest number of themes covered by one document extract was five.

The reason behind the choice of analysing the ground-up data was to illustrate the variety of tensions in the relationship of actors who are involved in the emergence of iXBRL. To address the research questions the researcher asked the following questions.

> *Why did the emergence of iXBRL come about? How does it unfold over time? What changes led to the development of iXBRL?*

The selected strategy has helped to design the timeline of the XBRL project in the UK and identify the main groups of actors actively participating in the implementation of XBRL. The words and phrases such as 'working group', 'XBRL supporters', 'advocates', 'important role', 'regulators', 'partners', 'new technology', 'technical solution' were searched and coded. They helped to build the context of the early stages of the XBRL project and identify the temporal sequence, causes and key developments preceding the emergence of iXBRL. The role and profile of each participant was also coded when the whole data set was re-analysed again. It was also important during the data analysis phase to identify the relationship between participants, and their roles and activities in relevance to each other. The detailed analysis follows on Chapter 6 and Chapter 7.

Addressing the research question about the contention around implementation of XBRL, thematic categories based on the specific elements that may have influenced the view of financial reporting were identified. There were two dimensions of each category at this stage of the research: (i) relevance to XBRL, and (ii) and relation to iXBRL. Codes such as 'pre-iXBRL', 'post-mandate', 'XHTML' specified categories and sub-categories. For example, when participants referred to the discussion with colleagues concerning the use of digital reporting standard after iXBRL had been mandated for financial reporting, a code 'post-mandate' was noted in NVivo. Similarly, when participants mentioned their challenges with building a freely available software for generating XBRL instance document prior to the emergence of iXBRL, these were coded 'pre-iXBRL'. The problem that arose was that multiple codes were assigned to the same text extracts. This indicated that the codes were significantly overlapping at the different stages of the project. The researcher reflected on ways to the illustrate findings and sometimes found it challenging to distinguish which technology participants referred to. At that times, documentary evidence was helpful in revealing some technical aspects of data.

The next stage of analysis helped to identify the patterns of relationship within the actor-network to implement XBRL and integrated the patterns of associations between actors into the theoretical approach. The researcher went back to ANT and investigated these patterns in more detail. After exhausting any elements relating to tension between actors that were found in the data, the analysis continued with a 'ground up' strategy in the unique context of ANT. In order to find the processes of translation, the transcripts were re-read and the researcher ran 'text queries' in NVivo. For instance, in the text queries, words such as 'collaborate' and 'together' were used which led to the process of 'collaboration' highlighting the ways actors aligned their interest. This process was followed the whole data set to capture how to the actor-network was formed, stabilised,

and how the programme of action has been altered. In order to avoid focusing on human interpretations (Pels, 1996), technology voice was mainly interpreted through coding of documentation such as iXBRL, XBRL, and taxonomy specifications which were amended and altered multiple times during the project. This evidence was coded and contrasted with each other. It offered a more nuanced understanding of how technology acted, changed, and responded to the network transformations. The analysis was complex because diverse technical terminologies were analysed. For example, one interviewee defined iXBRL as 'microformat', and it was only after in-depth analysis of meeting notes microformat was found to have had different technology built into it.

The process described above was performed iteratively for all the interview transcripts, interview notes and documents. Re-evaluation of the data was an ongoing task and strongest in the later stages of the analysis. Use of the final coding scheme in line with the ANT assumptions ensured that analysis of the transcriptions related rigorously to the research question and that the findings were pertinent (Easterby-Smith, Thorpe and Jackson, 2012).

5.9 Ethical Considerations

This section of the chapter will review the main ethical considerations in relevance to the interaction with participants and conducting the data analysis. As suggested by (Easterby-Smith, Thorpe and Jackson, 2012), the researcher should follow the main ethical principles to ensure no harm, privacy, confidentiality of research participants, and honesty and transparency in communicating the reporting research findings.

> *Qualitative research ethics are not only a question of procedures and protocols to follow for the researcher's legal protection, but also a researcher's position with regards to his/her commitment*

> *toward his/her subjects" (Santiago-Delefosse, Gavin, Bruchez, Roux, & Stephen, 2016, p. 148).*

One of the main ethical considerations was associated with providing comprehensive information about the research project. For this purpose, each participant has been presented with the following documentation explaining the details of the study:

1. Email to potential participants

2. Consent form and information sheet attached to the email with details of the research study. If the researcher contacted potential participants directly at the professional conferences, hard copies of the same documents were initially provided.

3. Interview schedule

All participants were informed of the audio recording of the conversation, both via the consent form provided in the email message or personal contact, and at the beginning of each interview. All interviewees' names were kept confidential during the data collection and reporting of the research findings. The researcher sent participants a consent form (in PDF format) in advance of an interview to allow them to familiarise themselves with the document. Before starting the interview, each of the interviewees were asked to sign the form and return the document of consent to the researcher. Their data was saved and backed up multiple times and are currently kept private and confidential on a password protected hard drive and on a secure Open University server according to the ethical compliance regulation. Additionally, the researcher has requested consent from participants to be able to publish evidence from the interviews while ensuring their names and professional profiles were kept confidential (see Appendix 3).

This study has received a favourable opinion for this research from the Research Ethics committee of the Open University (HREC/2014/1668/Mishchenko/1, see Appendix 4). Moreover, the researcher is to safeguard the rights of the research participants through anonymisation of their identities throughout this research. Confidentiality of data collected continues to be protected to maintain the trust bestowed on the researcher. The names of the participants are kept confidential and were coded as pseudonyms such as Reg1, IndAssoc2 and SoftVen3.

5.10 Understanding through Interaction

To acquire a necessary degree of credibility, a researcher needs to ensure that her observations always relate to the research topic and the unit of analysis studied. This allows the findings and conclusions of the research to accurately reflect a complex network of relationship between actors (Richard & Bader 2010). This section will provide an explicit explanation of the research processes to let the reader be involved in every stage of the project.

This study explicitly and methodically reported justification of the research methods selected for the research. The methodological limitations of the research were presented in Chapter 4 and Chapter 5. The researcher also stated how these limitations were tackled. One section of the thesis - Section 5.5.4 - is also devoted to explaining how interviews were conducted and how long each of the interviews lasted (see Appendix 6). In addition to this, the researcher participated in multiple XBRL International conferences and events, including the ICAEW Better Markets Conference 2013, EuroFiling XBRL Week in Frankfurt 2016, XBRL AccountingWeb workshop 2018 and live webinars organised by software vendors, to gain a first-hand experience and observe how the negotiation process of adopting XBRL was unfolding. She got familiar with the conference

presentations and watched the videos with webinars and online lessons on the use of iXBRL and XBRL. An email subscription to the news feed provided by XBRL UK was very helpful in identifying the recent developments in the XBRL project. It was also useful for identifying the views of the consortium on some of the major issues with implementing XBRL. Additionally, the researcher become acquainted with the front end of XBRL-enabled software at a user level and observed the accountant filing the tax reports using the HMRC website. These insights helped the researcher to obtain a clear understanding of participants and interpret their view of the technology during data analysis.

In the complexity to report the findings of an ANT study the researcher followed a structured research strategy proposed by several prominent ANT studies. From a qualitative point of view, data collection and analysis is subjective and to enhance credibility of the research it is crucial to explicitly take the researcher's influence on the data collection and analysis into account through being reflexive (Hammersley and Atkinson, 2007).

5.11 Chapter Summary

This chapter presented the main research approaches considered for this study and focused on the methods of data collection and data analysis chosen to address the research questions. This PhD thesis applies qualitative approach guided by the ANT methodology. The data evidence is based on in-depth semi-structured interviews and relevant professional documentation. To illustrate the appliance and appropriateness of the selected methods, this chapter outlines specific data collection techniques, the interview schedule and how the sample of participants was determined. Additionally, the chapter

reviews the data transcription process and methods of data analysis. The chapter closes with ethical considerations relating to collecting the data for this research study

Chapter 6 Socio-material Assemblages in Antecedent Network

6.1 Introduction to the Chapter

The next part of the thesis will provide analysis concerning how a new digital business reporting standard - iXBRL - was developed. It specifically addresses the question on how contention about the affordance of XBRL led to the emergence of iXBRL. In reviewing this quandary, the findings in this chapter are based on the analysis of interview data and documentary evidence which allows for exploration of the interactions of the socio-technical actors through which iXBRL was formed.

When examining the interests and needs of the key actors shaping iXBRL, the focus will be on "how users and other actors conform, ignore, modify, or usurp the original designers' interest" (Faraj *et al.* 2004, p. 189) when implementing a digital business reporting standard for filing companies' reports in the UK. The findings will utilise ANT that offers the possibility for understanding how actors form alliances and involve other actors including non-human objects to strengthen these alliances by supporting their interests (Lee and Oh, 2006). ANT's pivotal concepts such as translation (Callon, Rip and Law, 1986; Latour, 1987), affordances (Akrich & Latour 1992; Leonardi and Barley 2008), programme of action, and translation map (Latour, 1992) will be used as analytical tools to reveal the associations between actors supporting implementation of XBRL.

Chapter 6 will trace the structure of the network formed during pre-iXBRL phase of the project. The story of iXBRL stems from the emergence and reconfiguration of the XBRL network, therefore, it is necessary to include the analysis of the dynamics of the antecedent XBRL network presented in this chapter. In an attempt to reconstruct the unfolding

relations of actors within the XBRL network and their effects on the development of iXBRL, the analysis will refer to the timeline of the development of iXBRL presented in Chapter 2. Accordingly, this chapter is structured to follow the trajectory of the development of the regulatory project to implement XBRL that led to the emergence of iXBRL, and is therefore organised as follows:

Sections 6.2 provide analysis of the early development of the XBRL network and present some key insights into the origin and early motivations of the regulatory XBRL project in the UK. This chapter will evaluate the XBRL network observed through the four moments of translation (Callon, 1984). This antecedent network in which XBRL was located will provide insights into the key beliefs and interests inscribed in the XBRL project and subsequently influencing the development of iXBRL.

6.2 Preconditions for iXBRL: Antecedent Network

After establishing the context of the regulatory adoption of XBRL in the UK in Chapter 2, this chapter will focus on the role of the antecedent network in understanding the bricolage of the socio-technical actors from which iXBRL emerged. In an attempt to unfold the tensions and pressures formed in the XBRL network, the analysis in this chapter utilises Actor Network Theory (ANT) to construct interpretations about the data collected and analysed in this research. Accordingly, this section of the chapter frames the analysis around a number of key ANT concepts, including the concept of *translation*, the notion of *affordances* built into the socio-material object, and an idea of *programme of action* defining the trajectory of the project. These concepts have been previously explained in Chapter 4. This part of the chapter is structured to follow the socio-material analysis of the implementation of XBRL and subsequent development of iXBRL. The findings reported in this chapter are drawn chiefly from data collected through semi-structured

interviews and professional documentation (specifications, contracts, meeting notes, licences, official letters, and other evidence of public discussion on the relevant issues). To address the research question, this section analyses the change in the UK regulatory project to adopt XBRL that subsequently led to the emergence of the iXBRL technology.

6.2.1 Problematisation of existing e-filing

6.2.1.1 Early formation of the network to implement XBRL

The essential starting point for the XBRL adoption in the UK is generally associated with the issuance of the report of Lord Carter of Coles that provided review of the key HMRC online filing services (Mousa, 2011; Troshani, Parker and Lymer, 2015). It is often used as a reference point for the beginning of the implementation of XBRL in the UK (Dunne *et al.*, 2013; Troshani, Parker and Lymer, 2015; Alkhatib, Ojala and Collis, 2019). Prior to the analysing the role of this review in the implementation of XBRL, this research will assess any groundwork arrangements for including XBRL in the report.

It has been found that there were some earlier traces of XBRL in the network that led to the issuance of the Lord Carter's report confirming the foundation for the start of the XBRL project laid before 2006. The Lord Carter's recommendation to use XBRL was partially inspired by the Cabinet Office's proposal in using XBRL for corporation tax filings and financial reporting introduced by HMRC at the XBRL International conference in 2001 (Mousa 2010). The findings showed that XBRL UK was actively seeking support of the Cabinet Office and other government departments to use XBRL for a number of pilot projects subsequently discussed in several workshops organized by XII over 2002-2004.

> *We tried to get the Cabinet Office interested in XBRL, because if you get the Cabinet Office interested, they're the drivers of IT. They are very influential, and they have all the funding. We oiled the wheels of the government to respond to a business demand. (Consort1).*

By organising multiple events about XBRL technology and discussing some pilot projects, the regulators together with XBRL UK had already made a decision to implement it and started actively seeking support of allies prior to the issuance of the Lord Carter's report. All the activities directed toward supporting XBRL indicate of the early developments of the actor-network emerged out of the problematisation of e-filing before Lord Carter review. Interestingly, at that stage of the project the Cabinet Office played a critical role ensuring governmental support for XBRL and enrolling new actors. The e-Envoy office, the Cabinet Office's head IT office, established a Financial Transactions Working Group namely the Cabinet Office, HMRC, CH, the Office for National Statistics, and the Financial Services Authority.

> *I did in 2004 persuade the Cabinet Office to set up what I call the Financial Transactions Working Group. And this was HMRC, Companies House, the Office of National Statistics, the Financial Services Authority etc. And the idea was that we were going to try to promote XBRL around government in the UK and help to make things happen more quickly. (Reg2)*

The group aligned the interests of the governmental agencies to strengthen the position of XBRL within the network.

> *Our [Financial Transactions Working Group] objective is to develop data exchange standards to be used for the single filing of company accounts to government [and to] seek a common approach for the wider use and deployment of XBRL within Government; in partnership with the XBRL Consortium, the UK accountancy profession and the software supply industry... to achieve a common*

> *taxonomy for the use of XBRL for financial transactions and reporting with government departments and agencies (XBRL International Inc. 2003b, p. 2) (Document27).*

However, as soon as HMRC started testing XBRL for its possible implementation, the Cabinet Office stepped down from overseeing the further development of the technology which made HMRC accept the leading role of the XBRL adopter.

> *The idea was that we [Financial Transactions Working Group] were going to try to promote XBRL around government in the UK. In practise, what happened was the Cabinet Office decided that although they thought it was a good idea, they withdrew from chairing this group and it was left to HMRC. (Reg3)*

This evidence is consistent with the previous research suggesting that when Lord Carter's review took place between 2001 and 2005, early testing and pilot projects were conducted by HMRC (Troshani, Parker and Lymer, 2015). This is indicative of the formation of the network for establishing the implementation of XBRL for regulatory filings in the UK as early as in 2002.

By following the traces of the key actors, the study has also found that the network advocating the problematisation of e-filing was extended to the professional accounting bodies. One of the first actors representing the interest of filers enrolled in the network was the Institute of Chartered Accountants in England and Wales (ICAEW). The importance of ICAEW as an ally to the programme of XBRL has been confirmed by the interview and document evidence (ICAEW, 2004).

> *The ICAEW was the facilitator of the jurisdiction [XBRL UK]. We sought help from them. We made some good relationships with them. (Consort 6)*

> *The ICAEW is one of the organisations who support the XBRL movement in the UK through the XBRL UK. I think that helps*

> *because that provided some more legitimacy [to XBRL project]. (IndAssoc5)*

The main interest of ICAEW that was translated into the network was associated with the potential of XBRL for processing submissions by other users such as investors and analysts.

> *All the things XBRL can give you in terms of understanding financial information just wasn't available for us. That was the immediate attraction, but it didn't take me more than a couple of weeks to realise that it went a lot further than that potentially in enabling information to be passed readily between people at different stages of processing as well as providing information to investors and to all kinds of different people. (IndAssoc4)*

Interestingly, the ICAEW represented the interests of its members, however it was criticised by the business reporting community for being an advocate of XBRL as a business solution.

> *Comments on XBRL in this report could risk accusations that the ICAEW is seeking to act both as a leading advocate of XBRL as a business solution and as a judge and critic of XBRL's merits and potential by offering an independent and measured assessment of it. However, these two roles are reconciled, and indeed justified, by reference to the ICAEW's role as a professional body acting in the public interest. (ICAEW 2004, p.6)*

This evidence suggests that the ICAEW was involved in discussion of the practical applications of XBRL by HMRC prior to the issuance of the Lord Carter report and, despite its different interest in the XBRL adoption in the UK to the expectations of regulators, contributed to the strength of the network.

To address the question of the formation of the antecedent network to adopt XBRL for HMRC and CH, it can be concluded that the early work on engaging of XBRL with the

key actors commenced with the introduction of XBRL to the HMRC and CH. Thus, the network was established and contributed to work of the Lord Carter's review by successful coordination and interaction between the involved actors.

6.2.1.2 Lord Carter's report establishing problematisation of existing e-filing

In 2006 Lord Carter's review of HMRC's online services indicated that "there are too many, often overlapping, forms and data requirements with no scheme to reduce their number" (Carter, 2006) (Figure 3: event 11). Following the recommendation of the report, HMRC and CH started considering establishing new collaboration between them in relation to filing business accounts. The decision to implement a joint filing facility was proposed by the Department of Business, Industry and Skills (BIS), a parent department of the Companies House (Reg5). The new facility was to deliver "potential savings of £60 million per annum" (BIS 2009, p. 88). One of the key messages of the Lord Carter's report was the recommendation of the implementation of XBRL.

> *All companies should be required to file their company tax returns online, using XBRL, and make payments electronically, for returns due after 31 March 2010 (Carter, 2006) (Document7).*
>
> *We [Department of Trade and Industry and Companies House] recommend that HM Revenue and Customs and Companies House should work towards providing a joint filing facility so that companies and their agents only have to submit the same information once…We therefore recommend that HMRC should defer requirements for online filing by companies to 2010 and that they should aim to provide a joint filing facility before that time (Carter, 2006) (Document7).*

Accordingly, the Lord Carter report determined the key actors undertaking a variety of negotiations to implement XBRL – HMRC and CH. Translation within the network of actors is often led by a key actor that manages a variety of negotiations with heterogeneous

actors in a network to construct a technical artefact and achieve network stability (Callon, Rip and Law, 1986; Ramiller, 2005). Lord Carter's report confirmed the position of HMRC as a major figure that could develop and direct the project to implement XBRL. Following ANT conceptualisation of the network building activities of key actors' as they attempt to coordinate the programme of action, the XBRL implementation project can become the programme to create a stable network and recognise the technical artefact – XBRL - as a solution to a common problem (Ramiller, 2005). XBRL was legitimised as a major part of the solution to the identified problems with modernisation of HMRC services, and the online filing in particular (Troshani, Parker and Lymer, 2015).

> *HMRC for a while has had three big strategic objectives. We have to 'close the tax gap', we have to deliver sustainable cost reductions, and to close that gap and we have also decided that we needed to improve our customers' experience of dealing with HMRC; and XBRL was important and played to all three of those. (Reg6).*

One of the reasons for taking-up XBRL was concerned the delay of the investigation of companies' tax returns and companies accounts that were the subject of further enquiry. The gap in time between submission of the filing and conducting the enquiry by regulators was a major issue for regulators and could sometimes take up to two years. "Closing the tax gap" (Reg3, Reg6) was associated with reducing this time and make the processing of enquiry more efficient.

> *They [enquiries] would typically take upwards of 18 months between us first writing to the company and saying: "Thank you for what you've sent us. We've got some additional questions"…correspondence backwards and forwards potentially involving other parties before we say "Thank you very much, now we've reached a conclusion". If a particular company's return of computations became a subject of an enquiry, we were also*

> *confident that XBRL would make the conduct of that enquiry more efficient. (Reg6)*

XBRL was also expected to deliver significant cost reductions and improve the e-filing services by making them more efficient and accurate. The latter benefit of XBRL was associated with XBRL allowing comparability of the XBRL-enabled filings.

> *At the outset it was the interest in actually getting better data, having the ability to interrogate the data and to perform the data comparison. Because all HMRC were getting at that time was accounts on paper, so we had vast amounts of information that were completely inaccessible. And there was no way of doing easy comparisons. (Reg 9)*

As it can been seen, since the establishment of the HMRC's e-services programme in 2001 (Figure 3: event 11), HMRC adopted a view of problematisation of the existing financial systems by identifying problems of efficiency, transparency, and accuracy that made XBRL an attractive solution.

> *We [regulators] wanted greater certainty that where we were enquiring further into disclosures, that we were choosing the right ones, where the greatest risk was. We didn't have that degree of certainty. (Reg4)*

> *As I had got many years' experience before that in data standards, understanding the need to actually have a standard to enable systems to interact and different organisations to interact. So XBRL was a fairly easy sell for me. (Reg4)*

This view was also heavily supported by XBRL UK that sought to enrol more allies and supporters in the actor-network by improving XBRL awareness and attempting to make XBRL an established, viable solution to the issues listed in Lord Carter report. As the report provided a detailed review of the issues with financial reporting, it can be argued

that it XBRL UK played a major role in supporting this position by raising the same issues prior to the issuance of the report.

> *Our understanding is that the architecture underpinning some of the online services HMRC provides is now outdated and extra capacity cannot simply be bolted on. Nearly 25% of income tax self-assessment returns were filed online in 2005-06. However, this is still relatively low compared with some other countries, such as the USA where over 50% of personal tax returns were submitted electronically last year. Use of the CT and VAT Online services by businesses and their agents, has been even lower. In part this reflects a perception among some groups that the services do not offer significant benefits (Carter, 2006) (Document7).*
>
> *Improving the accuracy of the data exchanged with HMRC will be one of the keys to increase efficiency and reducing the time that HMRC and its customers have to spend on error correction (Carter, 2006) (Document7).*
>
> *We wanted to drive HMRC to take further, it's existing online reporting. They'd already been reasonably successful in developing online reporting for, or online submission anyway, for income tax, and VAT. However, we drove them to move away from the outdated systems and drove them to want to try and do that for companies as well (Consort2).*

Lord Carter's report confirmed the problems with the existing filing systems and formally recorded the main issues associated with the efficiency, accuracy, and costs of the existing filing systems. By doing so, it encouraged perceptions of legitimacy of XBRL amongst the actors of the network. The analysis presented in this section has allowed us to trace the emergence of the actor-network to implement XBRL for regulatory e-filing in the UK that was mainly based on the aligning interests of the actors and problematising the existing practices. The network has successfully enrolled the following groups of actors: XBRL, XBRL UK, HMRC, CH, ICAEW, Lord Carter's report and, despite their

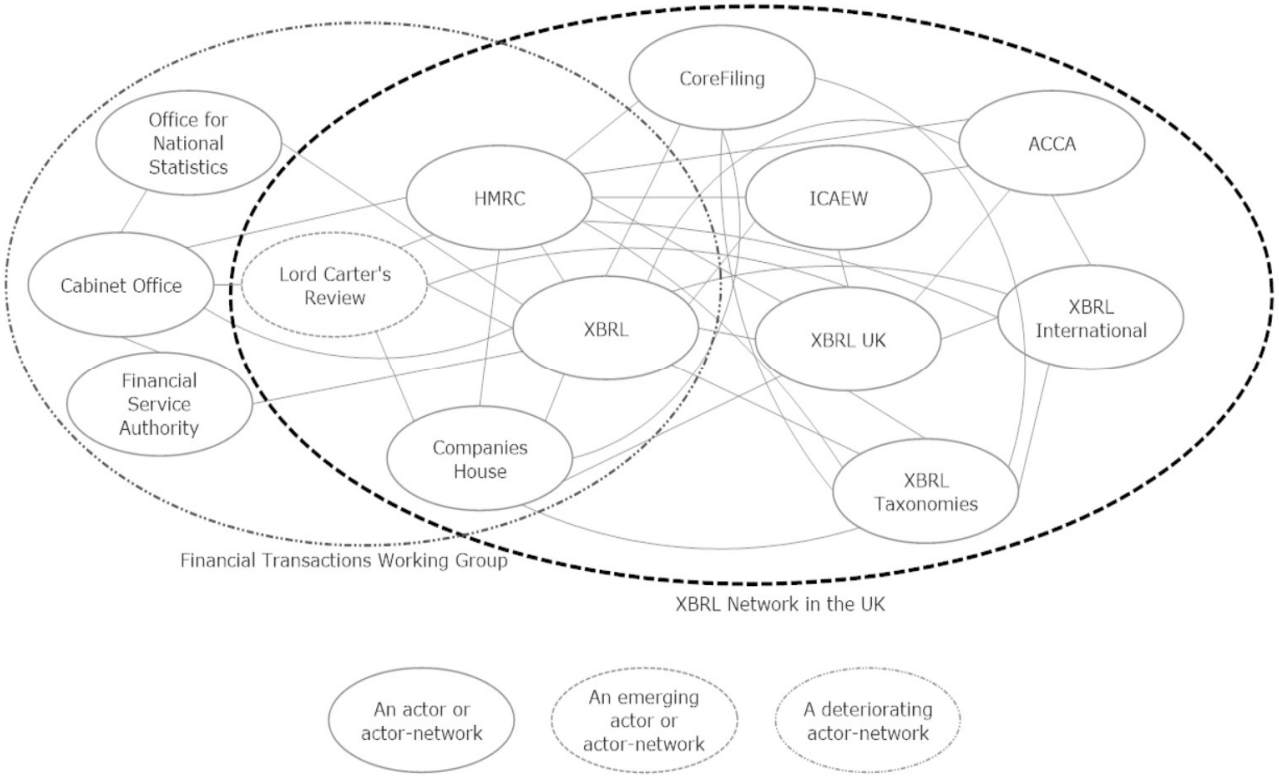
important role in promoting XBRL, failed to enrol other government departments, including the Cabinet Office, the Office for National Statistics, and the Financial Services Authority.

Although the actors of the network were seeking opportunities in the adoption of XBRL, they all expressed interests in continuing the programme of action and implementing XBRL. Bringing different expectations of the actors into one programme of action required XBRL to make affordances to the heterogenous groups of actors. The key affordance in relation to the regulatory issues was concerned with comparability that will allow a more efficient and less costly processing of the companies' submissions. An interesting observation to emerge from the data was that the affordance of XBRL to allow comparability of reports met the needs and interests of regulators as well as the ICAEW representing filers of the reports. It was interpreted as the benefit for both groups: regulators and investors, analysts. The next section considers how other groups of actors translated their interests in the network and effect the stability of the network.

Analysis of the early stages of the implementation of the XBRL standard for business reporting in the UK demonstrated what particular groups of actors enrolled into the network. The emerging actor-network gained new allies and was strengthened by the support and resources of the new actors. However, this network underwent several subsequent transformations due to a shift in view of some actors and other key factors influencing its strength. Figure 5 was constructed in attempt to represent the relationships between technological actors (e.g. XBRL) and organisations engaged in the pre-iXBRL stage of the project to implement XBRL for regulatory filing. It is important to note that when building this visual web of interactions between actors, the possibility of endless extensions of the network were recognised by the researcher. The network was limited to

fit the scope of the research and to highlight the key socio-technical associations during the early stages of XBRL implementation. Tracing the associations between actors resulted in the construction of multiple intertwined links between actors involved in the project. As this study centres on the implementation of XBRL, almost every key group of actors built an association with XBRL at the early stages of the XBRL project. The emerging network included governmental organisations, consortium, XBRL, its taxonomies, two professional accounting bodies, and Lord Carter's report – an artefact produced with the help of key members of the network. The Financial Transactions Working Group formed at the early stages is illustrated as a deteriorating actor-network whose actors were excluded from the project.

Figure 5: Emergence and Reconfiguration of Actor-Network during Implementation of XBRL: Pre-iXBRL Stage



6.2.2 Maintaining the Network: Weak interessement

In 2006, HMRC attempted to extend its network by advocating XBRL to large accounting firms namely the 'Big4' consulting firms, software developers, and accounting industry associations. The first live demonstration of XBRL filing took place at the XBRL UK conference in 2006 (Figure 3: event 12). It was run by HMRC and CH in cooperation with DecisionSoft (CoreFiling). HMRC also introduced its validation and processing engine (*True North*) designed to validate XBRL documents, to flag errors, anomalies, and to check XBRL documents against the linkbase before submission to the regulator. This type of demonstration can be very powerful; if the actors within the network approve the XBRL functionality, they become enrolled and inscribe their interests into the implementation of XBRL, and thus can strengthen the network by providing resources.

6.2.2.1 Failure to 'lock in' software vendors

Software vendors had a long history of resisting XBRL implementation (Troshani and Lymer, 2010; Troshani, Parker and Lymer, 2015). Software vendors develop applications that facilitate the production and usage of XBRL instance documents. The views of eight interviewees were that the success of the XBRL project was impossible without the enrolment of software vendors supporting the project, which corresponds with existent literature (Doolin and Troshani, 2007; Locke and Lowe, 2007a; Boritz and No, 2008; Debreceny, Farewell and Piechocki, 2010; Troshani, Parker and Lymer, 2015). In addition, the overall benefits of the XBRL technology were not perceived as convincing by the software vendor community (Troshani and Rao, 2007; Dunne *et al.*, 2013; Guilloux *et al.*, 2013), and a weak interest in developing XBRL-enabled applications, was confirmed by most of the interviewees.

> *There was a lot of work done with the software market to persuade them to take XBRL on board. HMRCs mandate was probably the main driver because in the first instance, if the software companies did not provide a good product, then they would lose market share because of the mandate that would require their users to actually produce the conversion [to XBRL files]. The mandate forced the market to adopt XBRL and it's gone on from there. (SoftVen1)*
>
> *The regulators had to persuade the software vendors that it was a decent standard, and it was worth doing. (SoftVen2).*
>
> *I think there was the potential for the software industry to be able to provide businesses with great products and to have integrated software packages which do a consistent job. However, it just didn't happen. (Reg10)*

The analysis found that XBRL "caused a wave of concerns amongst software providers" (SoftVen5). There were multiple issues associated with encouraging the software vendor market to align their interests with the regulators and XBRL UK, and build adequate XBRL-enabled applications. Among those, were concerns about the future development of the project and sufficient market demand for XBRL converters, until XBRL-enabled filing was mandated.

> *They [regulators] felt the software vendors were really dragging their heels, in terms of responding to XBRL. And I think for a period of time it was almost a game of call my bluff. The software vendors weren't totally sure that HMRC were actually going to do this…and it was only when they really believed that HMRC were going to stick to the deadline that most of them really got moving on it. (Consort2)*

The software vendors consistently reported that there was no indication of high market demand from clients at the early stages of the project when the mandate date was not yet determined. The main risks associated with investing significant effort in changing and developing the software packages were concerned with extra costs and possible loss of

market share. These issues explain a limited supply of the XBRL-embedded applications in 2006. As a result, the lack of interest in engaging with XBRL served to dissuade a number of major software providers from becoming a part of the XBRL UK project and being enrolled in the network.

> *I think you may have chief technology officers, chief information officers, chief execs [executives] in other departments and agencies keeping a watching brief, saying 'let's see how this goes, [we] could be very interested in it, but we'll let somebody else make the mistakes or go through the pain [of developing new applications] before we do…let's wait until the market demands it, we don't feel entrepreneurial enough to take the risk of inventing a new product. (SoftVen3)*

This evidence illustrates the interest in XBRL, but also demonstrates reluctance of the software vendors to design new products and adjust existing applications to the new technology. Overall, the study has found that the interest of actors producing the software applications varied greatly depending on their customers – buyers of the software products and filers of companies' reports.

> *A lot of those organisations [software vendors] were saying: "Well, actually, I'm not sure my customers want it, because my board of directors, and my client companies may not need XBRL producing information. What are the benefits from it? So, there wasn't a great deal of interest originally from the major vendors. (Consort3)*

This issue combined with the regulators not being able to convey the importance of the future capacity of the market resulted in the limited offerings of the XBRL-enabled software products. This in turn adversely affected the interessement amongst this group of actors.

In addition to the lack of demand without a mandate, software vendors recognised the complexity of XBRL. When XBRL UK performed the live demonstration of XBRL to the tax software vendor community, the major players in the market for accounting software, including IRIS, SAGE, and Digita, found the technology too complex to embed into their products and adjust it with a change of the taxonomy. At first, the two major providers of accounting packages, IRIS and SAGE expressed their interest in XBRL, however, they resisted the XBRL implementation in the shape and format it was promoted by the regulators. As a result, they stopped attending the XBRL International conferences and other events associated with the development of the XBRL project.

> *SAGE and other software vendors confirmed that turning their accounting software into something that will tag the accounts and produce XBRL output is really easy. However, eventually they realised they underestimated just how difficult it was going to be. (IndAssoc3)*

> *All the demonstrations to the software vendors in the UK about how this [filing using XBRL] would work showed that people were not accepting it. (Reg6).*

The demonstration was made to perform and enrol new allies; however, it was not convincing to the key actors like software vendors. Although, efforts of HMRC to translate software vendors were evident in the data, there was no strong association formed between software vendors and other actors within the actor-network. Regulators' efforts partially failed due to the unexpected complexity which could create higher cost and possibly risked the stability of the rest of the accounting software package. These issues, added to the lack of demand, were found to be the key factors for the lack of interest of software vendors.

One observation which emerged from the data was that HMRC had successfully enrolled two major accounting vendors.

> *HMRC worked very closely with all two big accounting package vendors in this country to make sure there was a commonly agreed strategy, or at least commonly agreed tactics, each year, for getting finished schemas or taxonomy out to them [when XBRL was implemented] (SoftVen1).*

This statement indicated a partial advancement of the regulators' objectives, yet a common view amongst interviewees was that this collaboration was exclusive of other actors.

> *There wasn't a great deal of interest originally from the major ERP vendors. Some of them however have become more interested. There were a few that moved early, but even if they did, they weren't very good at sharing what they were doing. There were certain people at HMRC, HMRC probably had a better idea what these software vendors were doing, but it was a general feeling, it was a concern, that they were not really sharing what they were working on. (SoftVen3)*

Moreover, one strong association within the actor-network which was built between HMRC and one software vendor – their technical partner since 1999. However, their capabilities to work on the XML technology closely related to XBRL, helped them to build strong partnership arrangements across governmental departments. The strategy of the software vendor was found to be excluding, in the sense that the software developers were not part of the dialogue resolving the issues of building the infrastructure for the XBRL-enabled electronic submission of the financial reports.

> *I really can understand other vendors thinking and experience that they were isolated because as soon as they [regulators and XBRL UK] started publishing the guidance, there was such a negative*

> *response from all over the place. But you can understand it, because this is how big projects sometimes work. It was just easier for them to talk with some key people about the main issues, and to do everything behind the closed door. (SoftVen5)*

This in turn instigated a perception of the XBRL standard as becoming a part of an inadequate governmental programme imposing new regulatory obligations on UK businesses. This view of the XBRL project was heavily supported by another key actor representing a major part of software vendors - Business Application Software Developers Association (BASDA). BASDA is a UK based not-for-profit association with over 200 member-organisation, including Oracle, SAGE, Microsoft etc. Involvement of BASDA in the XBRL project was found to be controversial and had a direct impact on the development of the XBRL project. The view that the XBRL project was a "Red-Tape Campaign" (IndAssoc4) with the new governmental rules and regulations added "to their misery with a whole new set of schemes" (SoftVen4) was shared amongst some of the BASDA members. Limited knowledge about the development of the XBRL project triggered questioning of the benefits of XBRL and complexity of its implementation.

> *FSA [Financial Services Authority] wants to impose a highly complex electronic standard for transmitting the financial data, called XBRL. We fully support electronic submissions and the use of XML, but XBRL adds a high level of complexity to what is a relatively simple operation. We have found that rather than lessening the burden on the organisation submitting the information, it increases the work it has to undertake (BASDA Newsletter 2004) (Document5).*

> *This standard was designed for large multi-national companies and its complexity has so far prevented its take-up by other than a handful of determined organisations. Unlike standard XML which can be embedded into business applications, XBRL needs to be*

> *configured by the company sending the data transmission, making it very difficult for novice users (BASDA 2005)(Document 5).*

XML expertise was strong within the software vendor community. The opinion that a "straightforward XML" (SoftVen4) would be a better option for the regulatory project in the UK was strongly supported by BASDA and British Computer Society (BCS). The XML document layout is not defined in its document or in its Schema. This rule of separating content from the presentation is considered to be one of the fundamental principles of the use of XML (Software AG, 2002). How a document should be represented is defined by a stylesheet created with eXtensible Stylesheet Language (XSL). The main criticism of XBRL was that it concerned a higher level of complexity that it added to generating the output of the submitted data and eXtensible Stylesheet Language Transformations (XSLT) file that should be applied to XBRL instance document. This issue could have resulted in difficulties in further processing of XBRL data by the users of the reports (e.g. investors, analysts). This view was quickly shared amongst the members of BASDA and created a 'disconnect' between some software vendors and regulators, and their allies.

As a response to the pressure to continue the programme of action, the complexity of the XBRL functionality was explained and justified by regulators and the software vendor – regulators' technical partner.

> *[BASDA] were arguing reasonably strongly that in the UK perhaps we should have just a straightforward XML. But to do everything the way that we needed to do it, to represent the complexity, I think you need to get to the point where you've got such a complex XML schema or you'd have to do some of the things that XBRL does and you'd just be reinventing the wheel in a non-standard way. We dismissed that fairly rapidly (Reg5).*

The disagreements with the software vendors demonstrated that regulators and their allies did not fully recognise the difficulties of the XBRL implementation and the issues it may create for software vendors. If the processing of XBRL filings was too complex by the users of reports, the proclaimed benefits of XBRL lose the value. This issue combined with the misjudged complexity of incorporating XBRL into their accounting software packages resulted in subsequent shift in the view of XBRL by some of the software developers who engaged with the actor-network at the beginning of the project. They came to the perception that XBRL did not have the capacity to become the key digital reporting standard for filing company reports in the UK if comparability of reports and interoperability of platforms could not be achieved.

The benefits of XBRL for users of the data could not be achieved without the use of supporting software applications built on the basis of the XBRL specifications essential to the operation of the XBRL technology. HMRC and CH actively sought the support of the software vendor community by organising workshops, conferences, and software developers' forums. However, the vendor community challenged the technical and organisational aspects of regulators, responding to the problematisation of the existing filing practices. As the software vendors' issues were not addressed by regulators and their allies, this created a problematic ground for enrolling them into the network. Effectively, the network could not continue the programme of action (Latour, 1992) to implement XBRL without the support of software vendors, and had to change a technology or routine to continue (Leonardi, 2011a); in effect to make a detour.

Another observation to emerge from the analysis of data was that the objective of regulators and their allies to enrol software vendors into the network was partially achieved by building relationships with their technical partner and two other ERP

software vendors. These actors successfully engaged with XBRL taxonomies and built strong associations between each other within the network. Analysis has also found the continuing role of the software vendor collaborating with regulators and XBRL UK.

Overall, tracing actor-network during the pre-iXBRL stage of the project revealed tensions between the regulatory-driven groups, XBRL, and software vendors. The findings suggest that regulators and their allies have not succeeded to mobilise the technology to communicate its benefits. The process of convincing software vendors to become allies and to act in accordance with the defined role of designers and developers of XBRL-enabled accounting software packages underwent two stages. Initially, a number of major software providers expressed an interest in XBRL and attempted engaging with it. The concerns about the lack of demand for the software products without the mandate of the XBRL filings resulted in the initial resistance to invest resources into engaging with XBRL. This issue in combination with the misjudged complexity of incorporating XBRL into the suites of integrated applications such as ERP, contributed to the perception of XBRL as constraining the existing filing mechanism and practices. The concerns about the possible risks of the stability of the packages with introduction of XBRL were also shared among the members of BASDA. As a result, the affordances of XBRL linked to its benefits such as comparability of data and interoperability between platforms, were perceived as constraints by the software vendors community. This second stage of the regulators' attempts to enrol software vendors resulted in shift of views in some software vendors that can be associated with the 'disconnect' between the widely advertised benefits of XBRL and its capabilities.

However, what was gained during this process included the output and successful enrolment of the regulators' technical partners. The recognition of their output

emphasised the special role of these actors in the subsequent developments of the XBRL project.

> *The technical bits which are normally the things which kill you in government projects, actually were a lesser order of magnitude because of the great people that we got from our partners. (Reg5)*

> *They [technical partners] had initially a very specific role in relation to the software industry. Within out wider team, we had people who championed different areas. They played an important role in acting as…directing where we were trying to go. (Reg4)*

The next section of this chapter will report the findings concerned with other groups of actors related with the XBRL project in the UK.

6.2.2.2 Interessement of Other Actors

Businesses - filers of the XBRL-enabled submissions comprises a wide group of actors that can be divided into three broad categories: (i) major consulting firms such as Deloitte, KMPG, PwC, EY, (ii) large businesses and medium to small enterprises (SMEs), including accountants preparing the filings for submission to the tax authorities, and (iii) professional industry associations representing filers: ICAEW, ACCA, CIOT, ICAS, the Association of Taxation Technicians (ATT), the Association of Accounting Technicians (AAT). Large accounting firms represent preparers of financial reports (on behalf of their corporate clients), whereas professional accounting bodies and industry associations represent small preparers, including SMEs. Large accounting firms were members of XBRL UK and actively participated in the negotiation of the development of the XBRL project at its early stages.

> *In 2001, and right from the outset at the conference [first XBRL International Conference 2001] spoke to loads of people from accountancy firms, particularly the 'Big4': PwC, KPMG, Deloitte,*

> *Ernst & Young, who were very interested in what XBRL had to offer. They perceived XBRL as a viable and sensible way forwards. It was evident right from the beginning that they were interested in it (SOFTVEN8).*

> *We had a collaboration with 'Big4' firms. And the idea was that they were going to try to promote XBRL around businesses. We were very successful in selling the idea [of XBRL] to them. You could find somebody in any of the firm who will be a strong supporter of XBRL. (Reg4)*

A key feature of XBRL which was particularly attractive to these firms was associated to the interoperability that enables common understanding of the processes and systems. As a result of utilising this benefit of XBRL, the regulatory systems could interact with the filers' platforms digitally and more efficiently. In addition to this, the automatisation of the input of data into companies' account forms and tax filings promised significant saving of time and costs for the 'Big4'.

> *If HMRC filing became more digitally enabled, we could interact with them digitally. Probably we could save quite a lot of costs by saving, both at the input time, if the returns are fed, or the data, in returns fed it through to data systems directly…I understood the need to enable different organisations to interact. (Business1)*

Strong evidence of the 'Big4' involvement into the XII network to adopt XBRL found in the data was consistent with previous research findings (Mousa, 2011; Troshani, Parker and Lymer, 2015). However, at the initial stages of XBRL implementation their enrolment in the actor-network was less apparent. For this reason, XBRL supporters found it necessary to direct their efforts toward gaining support of the audit firms. HMRC continued to conduct live demonstrations of XBRL at the workshops and conferences. And these attempts were not unavailing. A large part of the services provided by the 'Big4' firms to their customers are associated with reporting to multiple governmental agencies

on a frequent basis during a financial year. The consulting firms expected to gain benefits form the government-led XBRL project and became interested in the XBRL UK membership and building partnership with HMRC. These associations helped to align interests of regulators and XBRL allies and shaped the emerging actor-network. It has been found that these firms provided resources into project, including support in converting HMRC's needs to build the taxonomy.

> *There was great input from some independent consultants from Deloitte and PwC. They were engaged by HMRC as XBRL subject matter experts and they were quite heavily involved in the creation of the UK taxonomy. (Consort6)*

> *XBRL generally and globally has been driven by the accounting firms in their desire to maintain control over the production of financial statements and financial information. The accounting industry recognised early that tagged information was the next step beyond Excel or rekeying or HTML versions or Word versions of financial statements. They needed a way to consume that information. (Consort5)*

However, when the Lord Carter report was published, XBRL benefits were questioned and viewed from a different perspective. The accounting firms had to investigate how the technology could meet their objectives in practice and allow them to meet the interests of their clients.

> *I never thought it [XBRL] was going to be very difficult for a normal sort of company, a small company, with relatively simple accounts. But I remember we were going to meet Deloitte and they were showing me some of their more complex cases with tax computations. It just hadn't ever been mentioned by anybody before as an issue. It was pretty obvious that tagging would be unnecessarily complex and frankly to a level that we weren't interested in. (IndAssoc2)*

> *[At the XBRL International Conference 2002] We were asked by Deloitte – and by other accounting firms – to see whether there was a way in which we could actually simplify our requirement. They didn't want all the submissions tagged. There were concerns about having all the accounts tagged and how they would look. (IndAssoc2)*

One of the major concerns associated with the XBRL functionality, in particular a rendering mechanism it provided. This was mainly linked to the fact that the accounting firms' business could face some difficulties if a tax inspector viewed the submitted data in some other manner than it was intended and endorsed by their clients. The first trace in the actor-network that indicated the issue of inconsistency of presenting reports for different users of XBRL data. The accounting firms anticipated the pressure of their clients to require identical presentation of disclosures and processed digital reports.

> *These companies take an awful lot of time and trouble to prepare accounts in a way that, first of all, to present to shareholders and investors and also the way in which the information appears to HMRC, so to the person, to the tax inspector examining the accounts. (Business1)*

> *This [XBRL] is no good, we have an absolute God-given right, they [Big4] said, what we produce for our customers should look exactly the same as what the tax inspector sees. It's what they wanted and it's what they told HMRC they had to get. In other words, they would support it, as… they would support XBRL as long as they could continue to bill their customers to make their filings look pretty. (Consort5)*

Overall, the efforts of the accounting firms reflected an active participation of these actors in the implementation of XBRL. However, the research evidence is also indicative of their important role in problematisation of XBRL. Unlike software vendors, the 'Big4' firms aligned with the regulators and other actors and strengthened the actor-network, but at

later stage of the project their practical considerations of XBRL affordances resulted in a shift of views. Their concerns about the complexity of XBRL and the presentation of reports created dissonance in the network and tested its strength. These concerns were translated in the network and inscribed the accounting firms' interests into the resistance to the programme of action to implement XBRL. By acting as spokesperson on behalf of large businesses – their clients, the network undertook some transformation by building association between the programme of action and filers of reports.

Interestingly, accounting representative bodies –another group of actors representing filers - had a similar role in the XBRL project. While actively participating in early efforts of XBRL adoption, they expressed supporting views of XBRL in the accounting industry. For instance, ICAEW which represents the interests of its members in the UK business reporting community, became the facilitator of XBRL UK and the provider of its limited resource base at the early stages of the project (ICAEW 2004).

> *First of all, they [XBRL UK] were initially, I suppose you say, sponsored by the ICAEW. It was very comforting in the early days to realise that XBRL and the importance of it was actually understood by at least some of the elements of some of the departments in the ICAEW. Not everybody – I mean, it's like all large organisations – you get people, some people for, some people against ideas. But, on the whole, the ICAEW were always very good and very helpful. (Consort6)*

ICAEW also included "XBRL into the curricula of the accounting certification" (Troshani *et al.* 2015, p. 207). This endorsement played an important role and ensured additional support for XBRL UK in establishing legitimacy of the consortium and XBRL. ICAEW was also intended to encourage new actors to join the consortium (e.g. CIOT, ICAS) and participate in the emerging network (IndAssoc2).

> *XBRL is a new electronic language for financial data. It provides major benefits in the preparation, analysis and communication of business information. It offers cost savings, greater efficiency and improved accuracy and reliability to all those involved in supplying or using financial data.(ACCA 2004, p.7)(Document1)*
>
> *The IT Faculty of ICAEW is heavily involved with the development and take-up of XBRL, working on behalf of members and in the public interest (ICAEW 2004).*

However, the XBRL affordance to improve comparability of reports for all groups of users became weaker for the accounting representative bodies when small businesses and software vendors raised practical concerns in relation to the complexity, costs and associated risks of the XBRL implementation.

In the next section the researcher will analyse the change in approach of accounting representative bodies and accounting firms to enrol the support of filers.

6.2.2.3 Weak Convergence of Interests of Businesses: Role of Spokespersons

The outcome of accounting firms and industry associations' engagement with XBRL and its proponents was that selected individuals spoke as representatives for a largest group of actors - filers. Accounting representative firms and a limited number of large corporations had systematically contributed towards enhancing the credibility of the XBRL project and participated in interaction with the regulators. However, the data suggest businesses were excluded from the processes of shaping the XBRL project.

> *Businesses particularly struggled with this change [implementation of XBRL]. HMRC were not very concerned about our moaning and griping. The government have said this is where we're going to be, this is what we're going to do…We therefore wanted to see more consultation with businesses, a clear explanation of benefits to the business community and a package of support to help offset this new burden on business. (Business2)*

Interestingly, the programme could not continue without the support of the filers. Despite regulators having the power to mandate the XBRL-enabled filings, business representatives quickly became aware that they needed the agreement from the filers and other groups of actors, such as software vendors.

> *They [HMRC] may not admit that they didn't listen to us [businesses]…but they listened to…big players because they were very conscious of the fact that they wanted this to work and they wanted to get it through. (Business3)*

This supports the argument that regulators and their allies needed to translate actors into a network even though they had regulatory power. Thus, regulators had to define the role of accounting representative bodies as enrolling filers in the network. However, the findings suggest that ICAEW and ACCA's heavy involvement into the adoption of XBRL at the early stages of the project played an important role in their representation of smaller businesses. The analysis provides evidence that accounting representative bodies were accused of pursuing their own interests and acting as proponents and advocates of XBRL.

> *Clearly within the organisations, the representative bodies where these people work, they tried to protect their own domains, they tried to build empires, and quite often what we saw, where elections were coming up, because a lot of these representative bodies that the people were voted into the senior positions. (Reg5)*

Businesses were claimed to be represented by "large capitalist companies rather than small and medium businesses" and "largest consulting firms" (Business2). Viewed by many SMEs as an ineffective and expensive option (Debreceny, Farewell and Piechocki, 2010), XBRL became the source of contention between regulators and representatives of businesses, such as accounting representative bodies. In attempts to enrol small and medium businesses, industry associations and their allies organised a number of

workshops and seminars. However, the findings show that this interaction was not successful.

> *We kept in touch with the members, as much as possible,...Because we've got a lot of our members [that] work in industry. We did try to get input from them, as much as we possibly could, and encourage them to feed in to us, and occasionally talk to some of them. Unfortunately, it wasn't very productive. (IndAssoc1)*

> *There were some meetings with companies… individual companies. But not many of them came to the meetings that we were involved with. I know some were invited along, but we often found it difficult to get the commitment to the time that's required to contribute in these consultations because it's an awful lot of time. (Reg5)*

Based on the interview data, it can be concluded that mobilisation of an entire group of potential filers of XBRL reports was undermined by a weak convergence of the views of SMEs.

Overall, the analysis has identified that the enrolment of accounting firms and industry associations was successful at the early stages of the XBRL project. Affordances of XBRL were perceived as enabling comparability of reports for users, interoperability between computer systems of filers, regulators and other users, and cost and resources-saving solutions. Although XBRL was expected to address existing financial reporting problems and transform the regulatory filing process, the analysis has shown that these benefits were quickly dismissed by software vendors, large accounting firms and industry association when the first demonstration and trial projects took place. This has illustrated the manner in which XBRL transformed the actor-network by engaging with heterogenous actors. The more interaction XBRL had with the other actors, the more implications for the project became unfolded. The interaction between XBRL and other actors challenged the benefits of XBRL and its position as the key digital business

reporting standard for regulatory e-filing in the UK. One of the outcomes of this tension was that a large group of potential preparers of XBRL-enabled submissions were excluded from the negotiation and could not inscribe their interests into the actor-network.

6.2.3 Interessement of XBRL UK and XBRL taxonomies

One of the key features of the project to implement XBRL was the exclusion of a number of relevant actors from the network at various stages of the project. The negotiation space of the project was created around the regional branch of the consortium - XBRL UK – which was formed to provide the site for the XBRL-enabled filing within the UK national setting. The strength of XBRL UK in leading negotiations and decision making was associated with continuous support emanating from XII. The complexity of establishing the infrastructure for XBRL intensified the role of the local jurisdiction and helped to enrol some actors in the regular XBRL conferences and workshops.

> *It [XBRL UK] provided an umbrella organisation, a way of talking to the main stakeholders and for people who shared the same vision. (Reg3)*

> *They [the 'Big4'] understand that automation of financial reports had to happen eventually, so they wanted to be in control of it, as it happened, they wanted to be on that journey. And that's why they are all members of the XBRL UK jurisdiction. (Consort6)*

At the early stages of the XBRL project in the UK, the membership of XBRL UK remained very limited. The previous research confirmed that the membership fee model used by XII adversely affected the development of XBRL (Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013), and resulted in the lack of interest in technology by businesses and other groups of actors.

With the UK business community becoming concerned with the regulatory burden and possible mandate of the XBRL-enabled filings, XBRL UK was seeking more support and attracting resources. By becoming a member and paying membership fees of XBRL UK, actors were enrolled in the network. In this regard, the acceptance of government-led standardisation could be reinforced with every new group of actors enrolled in the network. When XBRL UK became established, it became apparent that there was no uniform vision of the main purpose of the XBRL implementation, despite the formal consensus of the XBRL UK members to support the XBRL project.

> *HMRC was imposing this reporting burden on all of UK business. And you would have ten people representing XBRL UK and these were the people all of whom had an economic vested interest in XBRL being introduced and implemented (Business1).*
>
> *Companies House and BIS are interested in availability of data to the markets, to generate additional impetus for the UK economy (Reg6).*
>
> *It looked like XBRL was working out, and HMRC wanted it. But the way we saw it – we could not see the advantages that XBRL could facilitate. We had an interest in making it easier for our clients to file with us. (IndAssoc2).*

One example of varied interests of the actors within XBRL UK concerned the development of XBRL UK taxonomy which represents one of the critical issues for an XBRL project (Locke and Lowe, 2007a; Troshani and Rao, 2007; Debreceny, Farewell and Piechocki, 2010; Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013). XBRL UK attempted to develop a local taxonomy for business reporting in the UK and specialised taxonomy for the financial tax filings. As the project evolved, there were significant difficulties with finding the resources and time for building the taxonomy. XBRL infrastructure required resources to develop and maintain the UK GAAP

taxonomy and a UK-extended IFRS taxonomy for businesses intending to use International Financial Reporting Standards (IFRS) in 2005 (Mousa, 2011).

> *XBRL UK never really had the resources to maintain and develop the UK GAAP tax on the long-term basis. A lot of the development work on the UK GAAP taxonomy was funded directly by HMRC and Companies House (Consort5).*

As the taxonomy was regarded as unstable and difficult to maintain, the extent to which the project to implement XBRL was effective, was largely determined by establishing who was in charge of the taxonomy development and who owns them.

> *Taxonomy was one of the big issues we were having. We had the whole question of how we were going to maintain the taxonomy, because up until then, it had been built by XBRL UK with volunteer effort (Consort2).*

Initially owned by XBRL UK, the UK taxonomies were objects of major efforts and became one of the most critical tasks for the mobilisation of actors. Development work had a limited budget provided by HMRC and CH, and XBRL UK contracted by the regulators were not delivering the desired functionality to allow tagging elements of every submission.

To comprehensively understand the architectural problem with taxonomy, it is necessary to address an issue of complexity of the accounting concepts which often require a degree of judgement when including them in the reports. Given the claim that taxonomies are designed to mirror the accounting reporting practices, XBRL transform accounting concepts into digital format, and thus it rationalises and fixes the way the data is structured by assigning a tag to a concept in an instance document. Taxonomies define the tags and place them in a hierarchical and calculation structure. Therefore, a degree of freedom in disclosing companies' accounts enquires a sophisticated processing software capable of

analysing each individual tag and demonstrating all possible variations of the relationship between concepts according to the accepted and useful taxonomy. It is also important to note the difference between the submitted reports – tax computation and accounts. Tax computations filing is comprised of a more structured document.

> *We [UK regulators] were looking at how we would automate this [filing] and move the accounts to XBRL and it started to become apparent from the experience with XBRL for the tax comp and worrying about accounts which were a whole different ballgame to computations. Tax computations are relatively structured. Although they can be quite complex, it is reasonably straightforward to determine what kind of data items you might be interested in in a tax comp. Accounts are more degrees of freedom again. There's much, much more that you can represent in a set of accounts that a company might want to disclose and contemplating building a taxonomy that would enable you to mark-up every possible bit of data that a company might want to include in their accounts…It's quite a daunting prospect. (Reg7)*

This difference was reflected in the challenges of building a complex taxonomy that could cover every concept of both tax computations and accounts. Interestingly, the option of developing two separate taxonomies was not considered even though accounts are presented separately. In practice, development of one taxonomy requiring major, highly skilled, resources became an impossible task for the XBRL community in the UK.

> *One extreme would have been to have built very, very large, complex taxonomies that covered every items eventuality. Representing every possible concept didn't sound very practical. We had some discussions with software vendors at that point…and realised we are beginning to wonder whether we've bitten off a bit more than we can chew. Bigger taxonomy was an option but didn't sound very attractive. We started looking at other options. (Reg7)*

The regulators and XBRL UK actively sought additional support to enable this challenging undertaking of developing and maintaining the taxonomy. A number of experts from major consulting firms and the regulators combined their efforts to ensure a taxonomy fit for the purpose of filing information with HMRC and CH.

> *There was some external help from certainly one or two of the 'Big4' consultancy. It was PwC. There was some PwC input. There was some input from some independent consultants...And then there were some external companies that HMRC went and consulted with who were selected on the basis of tax inspectors assuming or thinking that their accounts were either typical or potentially atypical and they went out and talked to them about how they created their tax computations and what kind of data was contained in them. There was quite a mix of people from within HMRC, outside, companies who filed tax comps and also accounts. (Reg5)*

> *We went through a whole series of workshops with industry experts and XBRL experts and businesspeople and we came up with, I think over the course of six to nine months, a taxonomy that would represent probably, in terms of overall numbers, maybe only 25-30% of what you might want in a tax computation. But it was good enough to provide that core XBRL taxonomy so that you could contemplate people building software or adding to their tax computation packages software to generate XBRL. (Consort3)*

There is a strong evidence that XBRL UK also sought for additional support by contracting external software vendors.

> *We had some discussions with software vendors at that point, [name omitted by the researcher]. They have 18 of the top 20 accountancy firms as their customers so they are by far the biggest tax computation software vendor and when you looked at their products and talked to them the concepts, so roughly speaking the same kind of concepts that you would see in a taxonomy, the kind of concepts that their tax computation software dealt with, I think they were*

> *estimating they had 35,000 concepts in their software that they can represent. Now, if you put 35,000 concepts into an XBRL taxonomy, that's a very, very big taxonomy and they didn't think that even then they were representing every possible concept that a tax computation could contain. (Reg7)*

The findings confirmed the previous research evidence that XBRL UK efforts were largely directed towards development of taxonomy (Troshani, Parker and Lymer, 2015).

> *XBRL UK had two problems. One, we didn't have enough money, to actually do it [develop taxonomy] or certainly, not to carry on maintain it. And we only got it done by turning around to HMRC, and Companies House, and saying, if you want this project to meet your deadline, you're going to have to fund some of this. We just don't have the money, or resource.*

Additionally, the data evidence confirmed that there was a growing sense of uncertainty among taxonomy designers about the architecture and the minimum number of tags to be included in the provisional versions resulting at "looking at other options" (Reg7). Overall, it shows that taxonomies caused profound issues with implementation of XBRL which created additional tension of XBRL UK and XBRL. XBRL affordance to provide taxonomy inscribing accounting concepts, rules and disclosures was found to be a complex matter that required significant resources from XBRL UK, regulators and their allies to adjust. The task to achieve uniformity of the filings of tax computations and companies' accounts allowing interoperability of information communication involved complex interaction of XBRL UK with heterogeneous actors. Although the evidence suggests partial success of building taxonomies, the overall outcome was work on the new option.

6.2.4 Failure of interessement Causing Detour in the Programme of Action

The research evidence has indicated that regulators and XBRL UK only partially succeeded in enrolling representatives of different groups of actors such as software vendors, accounting representative bodies, and businesses. They were unable to translate enough support and build sufficiently strong alliances to create a stable network around the XBRL implementation. A number of disagreements on the technical and legal aspects of the XBRL implementation led to the problematisation of e-filing using XBRL and forced regulators to address the pressure.

> *There was definitely pressure on HMRC to respond to all the issues raised by some of the most important people in XBRL…people from different organisations…and to make the HMRC project one of the major flagship XBRL projects in the world. (Consort3)*

The XBRL project required the translation of expertise and support of software vendors and software developers, businesses and other groups of actors. However, in the process of joining the network the key actors, including XBRL, the regulators, and XBRL UK failed to ensure enough support for the project to continue it according to the programme of action. As humans and other objects were brought together into an assemblage, attempts to translate their interests to continue implementation of XBRL, the defined actors' roles, did not always correspond to their performance within the network. This resulted in limited interessement in the XBRL actor-network. For instance, XBRL UK were not capable of providing a viable taxonomy design that met the interests and needs. Likewise, the accounting representative bodies and accounting firms enrolled in the network at the early stages of the XBRL project in the UK failed to fulfil their role of enrolling businesses and accountants – potential filers of financial reports using XBRL.

As a consequence, at the end of 2006 - beginning of 2007 the tension surrounding the future of XBRL led to strong opposition to the programme of action. The programme of action to implement XBRL became difficult to follow with the lack of understanding of the XBRL benefits for regulatory filing and perceived constraints of XBRL associated with its technical complexity resulting in additional costs and risks, rendering functionality, lack of demand by the markets, and difficulties of XBRL taxonomies development. At that stage, HMRC and its allies had to make decisions to ensure that the interests of enrolled actors were still translated into the actor-network and the programme of action continued.

> *The decision to go for online filing and to mandate the use of XBRL was taken to a new level…We realised this is going to place a big burden on businesses, they are going to have to incur extra costs on the software and on the tagging, so cross organisational support was absolutely critical in ensuring that the whole project went right the way through and was implemented. (Reg1)*

Despite the claimed benefits, the regulators and their allies started to articulate the technical difficulties with the XBRL technology. Members of the XBRL UK became uncertain of the potential power of the technology to reach adoption. When the main advocates of the technology recognise its complexity, the programme of action becomes questioned and prepares to secure its continuation by making changes or detours (Latour, 1992). The inscription of the interests of other groups of actors, including most XBRL UK members ('Big4' consulting firms, accounting representative bodies, and a number of major software vendors) as well as technological artefacts such as XML, XBRL taxonomy, HTML provided the basis for action against the programme to implement XBRL and shaped the future development of the XBRL project in the UK.

6.3 Chapter Summary

Chapter 6 presents analysis of data and addresses how the interview data and documentation helped to explore the antecedent network. The findings are framed around four moments of translation explained in Chapter 4. Overall, the chapter illustrates that the antecedent network of the programme of action was not always successful in achieving support for the implementation of XBRL. A growing uncertainty about maintenance and development of the XBRL taxonomies was an impetus for questioning the programme of action. Further developments of the XBRL project will be analysed in the next chapter.

Chapter 7 Socio-material Assemblages in the Emergence of iXBRL

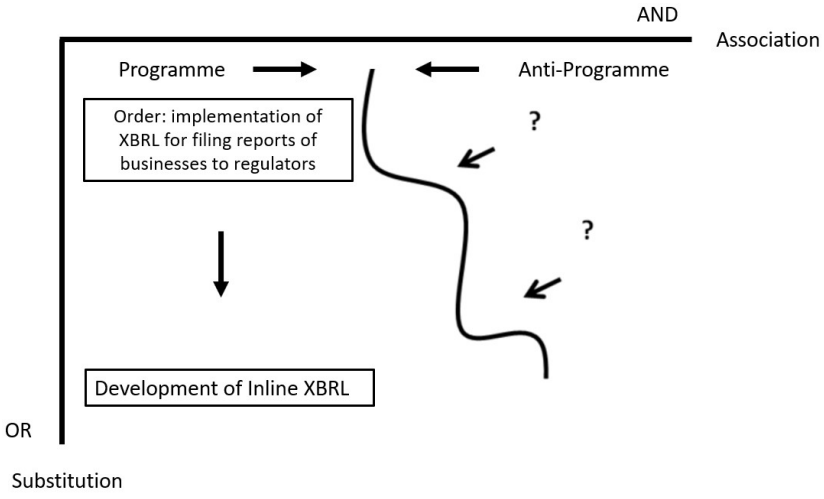
7.1 Introduction to the Chapter

Chapter 7 explains the process of decomposition of the XBRL network which results in the developing of a new actant – iXBRL – that replaces XBRL and gains enough support to mitigate the issues associated with the XBRL—based digital business reporting using. It provides analysis that unfolds the depth and nuances of the emergence of iXBRL and will be framed using Latour's (1992) translation map introduced in Chapter 4 (see Figure 4). It also demonstrates how XBRL had to make an affordance of rendering to continue the project and to strengthen the network. The newly-developed iXBRL provided critical support of software vendors, accountancy firms, and accounting industry associations. The chapter concludes with a brief summary of the findings drawn out of the analysis of the data.

Returning to the concept of programme of action, Latour (1992) develops an idea that the technology development process is following a programme of action that is opposed to anti-program. The review of the literature has illustrated the outline of the previous study of digital reporting standards applying the translation map (Guilloux *et al.*, 2013). It has served as a tool to demonstrate the broader tensions between developments of new technological artefacts (Guilloux, Locke and Lowe, 2013). As was mentioned in Chapter 4, Latour's translation map allows exploring the observed mechanisms of the development of iXBRL and helps explore its emergence by focusing on anti-program(s) opposed to the programme of action initiated by regulators in the UK (Figure 6). The

framework will help to detect the tensions surrounding the investigation of the development of the digital reporting standard.

Figure 6: Translation Map for the Development of iXBRL



Notwithstanding success of the XBRL implementation in attracting some support and recognition, the interests of the actors already translated in the network required XBRL - as a flexible socio-technical object - make detour and develop affordances that would allow strengthening the network. Mapping the key developments of the emergence of iXBRL will provide a visual presentation of the key gains and losses of the XBRL actor-network. Overall, the study adopts the translation map to gain insight into the transformations of the socio-technical network and also extends integration of the concept of the four moments of translation to explore how the changes have occurred and resulted in the emergence of iXBRL.

7.2 Problematisation of the XBRL rendering functionality

The main purpose of the previous part of this chapter was to demonstrate the failure of interessement by analysing the key factors causing it. It sought to obtain the findings which helped to address the main issues with the implementation of XBRL. The central

interest of the next section is to illustrate the fundamental underlying issue implicated in that failure.

As XBRL had already been used in the US Securities and Exchange Commission's (SEC) project for financial reporting information since 2005 as a key part of the XBRL voluntary filing programme which later became mandatory in 2009, the proposed rules and practices of the US prudential regulators were often used as a benchmark reference by the UK regulators.

> *And HMRC had to deal with all sort of issues just as any other environment, and SEC is the one that's most classic in that area. Their use of XBRL is significant. (SOFTVEN8)*

> *There are interesting examples of that [filing submission], the best known one is the SEC one, in which an instance document comes in with an extension and the regulator makes some assumptions about how that should look using some scripts. That creates lots of tension because that rendering is not the same as what the accountant has produced. (Reg6)*

The SEC XBRL programme to develop the system to support the XBRL format was contrasted to the UK XBRL project where actors started to emphasise the importance of the "freedom around presentation". (Reg5)

> *The business problem of Revenue [HMRC] and others was that preparers and accountants are in a presentation world, presentation is really important to them. (IndAssoc3)*

The regulators and XBRL UK were led to recognise the constraints of XBRL which inevitably weakened the XBRL network. An agreement among actors started to emerge that XBRL could not fully address the business reporting problems such as visual presentation of complex tagged accounts. The outcome of the lack of translation of actors

resulted in the issue with visual presentation of financial accounts to both filers and users. This tension became critical for survival of the XBRL technology.

> *What has been so critical is the ability for the human eye to see something and say I can process that and then hand it to a computer and say to the computer now you process it. Providing assurance over the written piece of paper was important. (IndAssoc5).*
>
> *Lots of people in this Anglo-Saxon environment wanted freedom around presentation, so that was a constraint, and the other constraint was audit. (Consort1)*

The concerns about the degree of assurance needed from auditing the integrity of digital reports were raised by eleven respondents. The way in which auditors can provide their opinion on digitally filed reports was different from the manual signature of paper-based financial reports. It became clear that electronic financial and business reporting could not take place without confidence in the security XBRL can provide in this regard due to the complications associated with auditing. The implications of XBRL-enabled filing for audit and assurance issues caused additional pressure for regulators and their allies to seek for an alternative technological solution.

> *There's no way the mandate could happen under the old arrangements [using XBRL]. It was clear, because of the nature of how accounting works, how people do the audit, how they then prepare things, sign off on them, and the statutory nature of all that. (Reg3)*
>
> *You cannot audit the XBRL unless you can see what it looks like. There are tools that will allow you to audit XBRL – that's a different matter. That's where the need for iXBRL came from. (SoftVen7a)*
>
> *If a company had produced a set of accounts that the accountant wants to be audited, the directors, they want to be able to look at*

> *them and see. Is that what we want to send? They don't want to look at a whole list of computer codes. (IndAssoc2)*

The problematisation of the rendering functionality of XBRL made task of the regulators and their allies to implement XBRL a complex challenge. The potential issue with "conventional" (Reg7) manner of processing an XBRL document was around the filer not being able to make a decision about the visual representation of the submitted accounts. As a result, the filers focus on two practices. Firstly, a filer needs to communicate the financial story of the performance of their organisation accurately, and secondly, make sure that the consumer receives the data with the same layout. The so-called standardised rendering mechanism allows authors of instance documents (filers) to create human-readable representation of data using XLST files that include contextual data, however, the presentation may not be reproduced in the same way for consumer of the XBRL file (e.g. regulator). The filer's story can be lost when consumers render the data back to the human-readable form – the process often called roundtripping4 in IT.

> *Once a clear, rendered version of an instance is available, a preparer may adjust its look and feel, using appropriate tools, to meet particular presentational needs, but that is beyond the scope of a standardised XBRL rendering method – it is the province of report-writing tools. Some receivers may wish to view reports whose presentation is determined by preparers…to avoid the risk of misunderstandings between the receiver and preparer. In these circumstances, receivers will typically receive a wide variety of formats and will not have any direct control over the format used. (Calvert, 2007) (Document6)*

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[4] Roundtripping in IT is the process of converting a file from one format to another, and then back to its original format using different types of processors (Techopedia, 2019).

When an instance document is submitted by a filer, it comes with an extension which is subsequently processed by a regulator who makes assumptions about how the document should look using scripts. The SEC programme was based on standardised rendering which created tension around the communication between filers and regulators in the XBRL project in the US (Debreceny and Farewell, 2011). The described rendering mechanism allowing taxonomy authors and instance creators to provide information on how they want data to be ordered was defined by the actors in the UK as "not at all easy to produce output that meets the quality levels demanded of the market" (Allen, 2008) (Document3). This indicated greater the strength of the support for the XBRL project in the UK and a different approach the UK regulators were taking. The rendering issue became the central concern of the key actors and its allies within the network. It was perceived as a constraint of XBRL. In the environment of an increasing problematisation it sturdily affirmed the disruption of the programme of action caused by the failure to translate other actors.

A growing contention about the affordances of XBRL ultimately reached the level when proponents of XBRL addressed the issue by searching for alternatives. This is indicative of a major detour in the programme to implement XBRL for filing to the UK regulators – HMRC and CH. The research evidence suggests the major consulting firms were the first actors having realised a unique opportunity to change the filing practice in XBRL and a develop a new technology which will allow the filings to look the same way as the HMRC tax inspector can see them. The 'Big4' and two other major consulting firms initiated the commencement of the project of regulators and XBRL UK developing a new functionality with "filings accessible for both preparers and consumers" (Business1).

> *The 'Big4' had to persuade HMRC that they need to come up with something fancy and new. The job was to meet the requirements to*

> *make it really easy for people to take this data [reports], encapsulate it in a human-readable format and turn that into XBRL at the far end. (Reg7).*

It is unsurprising that the 'Big4' firms were pioneering the development of a new functionality. As reported in Section 6.2.2.2 these accounting firms anticipated the pressure of their clients to require identical presentation of disclosures for all potential users of the digital reports, including regulators, investors, and analysts. However, as soon as the idea was shared amongst other members of the XBRL UK, all actors of the network were willing to become involved in realising it.

Overall, the findings presented in this section have indicated in the end of 2006 and beginning of 2007 the central concern of the project to implement XBRL was the XBRL rendering functionality perceived as constraints by the actors within the network. The main issue associated with the XBRL was its capability to allow to re-render instance documents from the perspective of preparers and consumers of reports. This affordance of the XBRL standard constraining the presentation of the submitted was directly linked to the issue of communication between filers and regulators, and was expected to enrol businesses – the largest group of actors related to the XBRL implementation. Moreover, it facilitated generating enough interessement in a new practice.

As demonstrated above, different actors expressed various concerns about high costs associated with the implementation of XBRL, use of XBRL and its technical complexity. Considering the interviewees' reports on the importance of the rendering issue, it can be concluded that the XBRL rendering functionality related to the presentation of reports relegated all other tensions to the background.

> *This project was about keeping the XBRL project on track. If we hadn't come up with another solution, it would have gone nowhere.*

We concentrated all our resources on the more likely targets. We were interested in a more sophisticated rendering solution. (Reg8)

The programme of action to continue the project had a detour that resulted in building the new aim to develop a technology that could solve the problems of rendering and re-rendering business reports.

7.3 Extensibility as Constraint of XBRL

As discussed in Chapter 3, one of the key features of the XBRL technology as an XML-based standard is its *extensibility*. The letter "X" in XBRL stands for 'eXtensible' and indicates that XBRL taxonomies can be modified and extended by filers, regulators and other actors to suit a particular reporting purpose (Debreceny *et al.*, 2009). It is often associated with customisability of XBRL reports as the technology provides an opportunity for individual companies to adapt the taxonomies and specifications to their needs and change or add concepts accordingly (Locke, Lymer and Lowe, 2009). From an ANT perspective, extensibility becomes an XBRL affordance as it is "[w]hat a device allows or forbids from the actors – human and nonhuman – that it anticipates" (Akrich & Latour 1992, p. 261). This affordance of XBRL is particularly interesting as it affords and constrains certain actions. Extensibility provides a degree of flexibility when creating extensions to the taxonomies, yet it can constrain the automated comparability through letting users of reports process the taxonomy in an alternate arrangement. XBRL's interest to "open up reports to different communities" (XBRL International Inc., 2018) (Document38) means that becoming a global standard used for business reporting requires it to make affordance to enable taxonomies to be built for any reporting situation. Extensibility of XBRL helps to reflect the diversity of companies and company

accounting in general. However, at the same time it allows inconsistency of the tagged data.

Since individual companies can extend the required base taxonomies, the regulatory regime can establish the extent of the customisability and define "the contract between reporter and regulator" (CoreFiling Limited, 2018) (Document8). Technical extensibility is built in to XBRL enabling a base taxonomy to be extended multiple times by actors other than the original developer. The regulator can decide the manner in which the reporting regime operates. For instance, the US GAAP taxonomy was designed to allow the filers to use extensions and, therefore, it covers a broad range of data items and reportable concepts. This taxonomy was intended to function in one single jurisdiction allowing private companies to extend it for the purpose of entity-specific disclosures. The extension style and architecture of the taxonomy are subject to regulators' policing in a given jurisdiction. Despite the SEC's efforts to discourage filers from the use of extensions, the majority of them find it necessary to provide their own additional concepts as part of the mandatory filer extension taxonomy to supplement their instance documents. Thus, the US GAAP taxonomy is developing as one taxonomy with many company extensions. This approach allows accountants and filers to participate in building the taxonomy. Another outcome of this approach is that regardless of the efforts by FASB to rationalised some elements, the goal of general comparability has clearly not been met yet (CoreFiling Limited, 2018) (Document8). To ensure improvements in the automation of data processing, the regulators are required to establish control and discipline over adding new taxonomy elements.

The UK regulators were aware of the issue of taxonomy extensions in the US, and, for this reason, considered a similar approach of not supporting filers adding new elements to the UK taxonomies.

> *Companies may create their own taxonomy extensions to define tags for company-specific data which is not covered by the main UK taxonomies. However, the use of such extensions for filing to HMRC and Companies House is discouraged at present.(XBRL UK 2013, p. 10) (Document39)*

The research has found that prior to the emergence of iXBRL there were divergent views on the use of extension. It could be limited to the local regulatory extensions or entity-specific extension could be allowed. This affordance of XBRL has become a challenge to stabilise the network around the implementation of XBRL. Although, the importance of extensions has been recognised, the existing approach adopted by the SEC in the US was criticised by the actors within the network to implement XBRL in the UK.

> *People explicitly use extensions to make it difficult to analyse XBRL. You can very easily use XBRL to prove how transparent you are while introducing a specifically designed concept to make it difficult to compare it to somebody else, but at the same time being completely transparent. (Consort6)*

> *One unknown was what happens to taxonomy extensions. When you look at the larger companies, you find that not all their [types of] data can't possibly fit into UK GAAP taxonomy or IFRS, you need to do extensions for that. We knew that requiring everyone in the market to create their own extensions or requiring all the big companies to create extensions was going to lead to political resistance – and technical resistance as well, because it's hard to do. We needed to find a way to avoid that. (SOFTVEN6)*

When extensibility of XBRL was problematised through regulators' work with the major consulting firms within the Rendering Working Group, the network started looking for

the trade-offs between extensibility and analysis of data using templates to facilitate surveillance of businesses by regulators. XBRL had to make significant compromises in favour of interests that provide the potential of regulatory requirement to drive adoption.

> *It suddenly dawned on regulators that there is actually a core of data that you want to analyse. You wouldn't want to analyse absolutely everything, because every company is different. You can't really compare the very detailed stuff from one company to another. The realisation was that with Inline [XBRL] we could build a reasonably compact taxonomy that represents the data concepts that you are really interested in in terms of automating, but you don't have to build a huge taxonomy just to accommodate every single last piece of information that someone wants to disclose. (SOFTVEN8)*

Search for the balance between extensibility of XBRL and perceived usefulness of the XBRL reports for further automated processing resulted in directing support and resources to the development of an alternative solution. This is when the interest of regulators and their allies was inscribed in the iXBRL.

Interestingly, regulators have not considered allowing extensions with filing in the XBRL format. The key factors in rejecting this option were associated with the perceived complexity of this practice for businesses and the costs associated with incorporating this technology in the accounting packages for software vendors.

> *Creating extensions was going to lead to political resistance – and technical resistance as well, because it's hard to do. We needed to find a way to avoid that. (SOFTVEN6)*

While there are important technological aspects of iXBRL such as rendering functionality that enrolled enough support for its strong position in the network, its extensibility

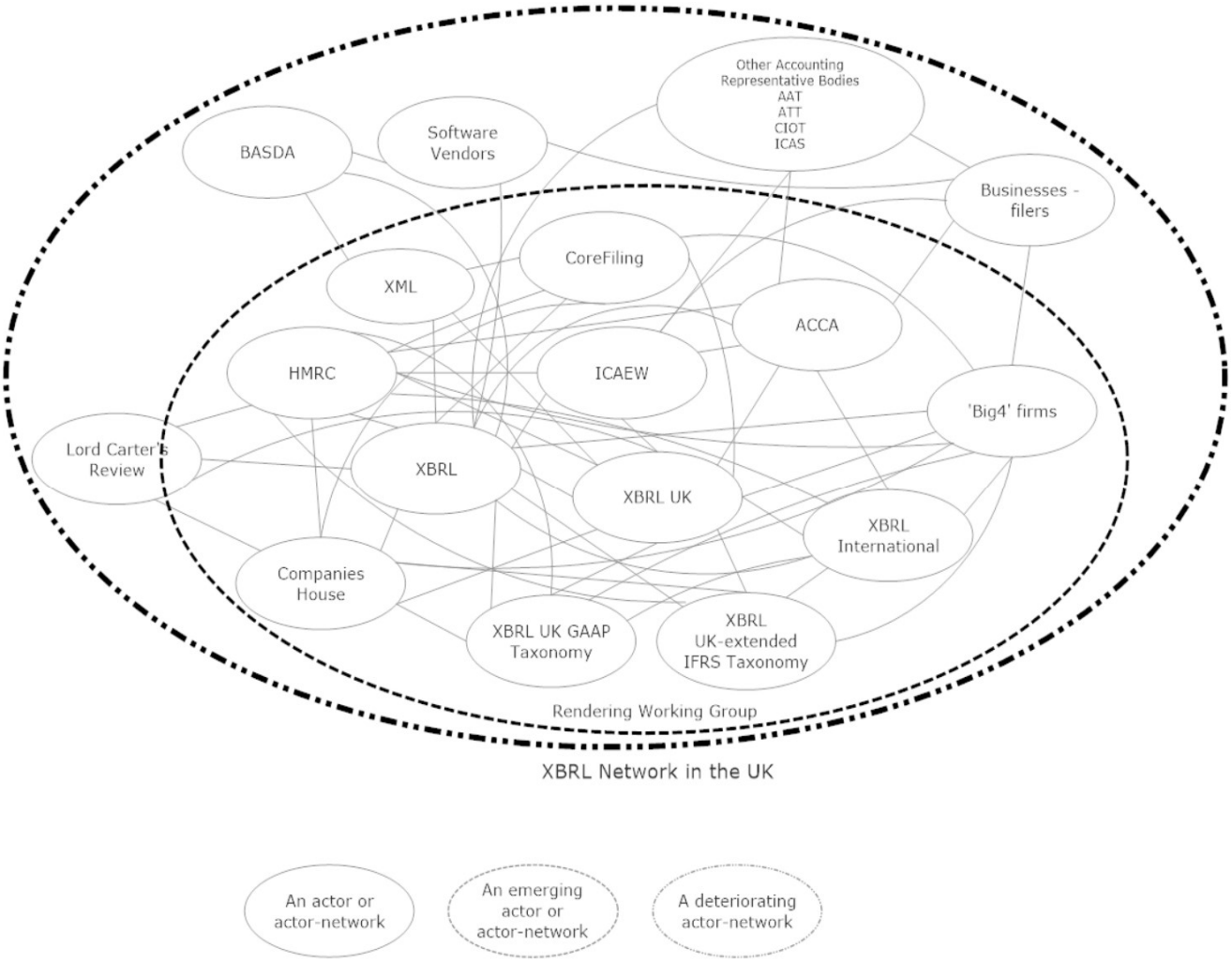
triggered a final rejection of XBRL in its existing form for the financial reporting in the UK.

> *Once we had determined internally at HMRC that Inline [XBRL} was probably the right way to go, we then had to convince the software industry and the accountancy firms that this was the right way to go. They were all worrying about XBRL because they thought it was big and horrible, because as accountants and software vendors they know about all the edge cases and all the difficult areas and all the strange things that companies do. This was going to be really hard, and taxonomies were going to be huge and difficult. (Reg10)*

Overall, the findings have indicated two main affordances of XBRL within the network that have led to development of the new solution. Firstly, the XBRL rendering functionality was perceived as a constraint, and, secondly, the extensibility of the XBRL taxonomy was recognised as a technology limiting analysis of the reports submitted to regulators.

The next section of the chapter will outline the main development in the emergence of iXBRL. It has been identified that regulatory-driven working group - the Rendering Working Group - formed by XII (Figure 3: event 14) was instrumental in translating interests into a new technological solution. The group included actors from HMRC, CH, XBRL UK, XII, 'Big4', ICAEW, ACCA, and CoreFiling who ultimately inscribed their interests into the technology. It allowed these actors to meet their demands from the regulatory filing to businesses (Figure 7).

Figure 7: Reconfiguration of Actor-Network during Implementation of XBRL: Emergence of Rendering Working Group



7.3.1 Interessement and enrolment of PDF: Developing an Intelligent Financial Statement

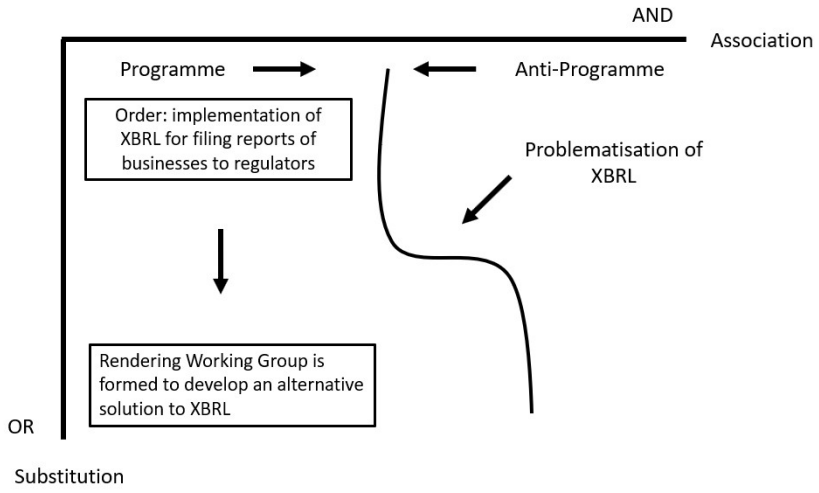
Responding to the pressure of the XBRL network in the UK, the Rendering Working Group began searching for alternative formats to amend the reporting mechanism. At this stage of the project, XBRL was no longer considered as a viable solution. This suggests that at that stage of the project, its further developments continued the original programme of action. During this process, there was no resistance associated with the

search of a new technology, and, therefore, developments of new solutions became a part of the programme of action.

Figure 8 illustrates how the trajectory of the project is shaped by forming alliances and making compromises. With the expansion of XBRL, the programme to implement a digital business reporting standard in the UK enrols the XBRL technology and changes the project. When XBRL was successfully problematised, and failed to enrol enough support, a *detour* was made that resulted in the emergence of the Rendering Working Group formed by the XII consortium.

> *The group was responsible for delivering a standard for the rendering of XBRL instances in human-readable form (SOFTVEN8).*

Figure 8: Translation Mapping of the Development of iXBRL

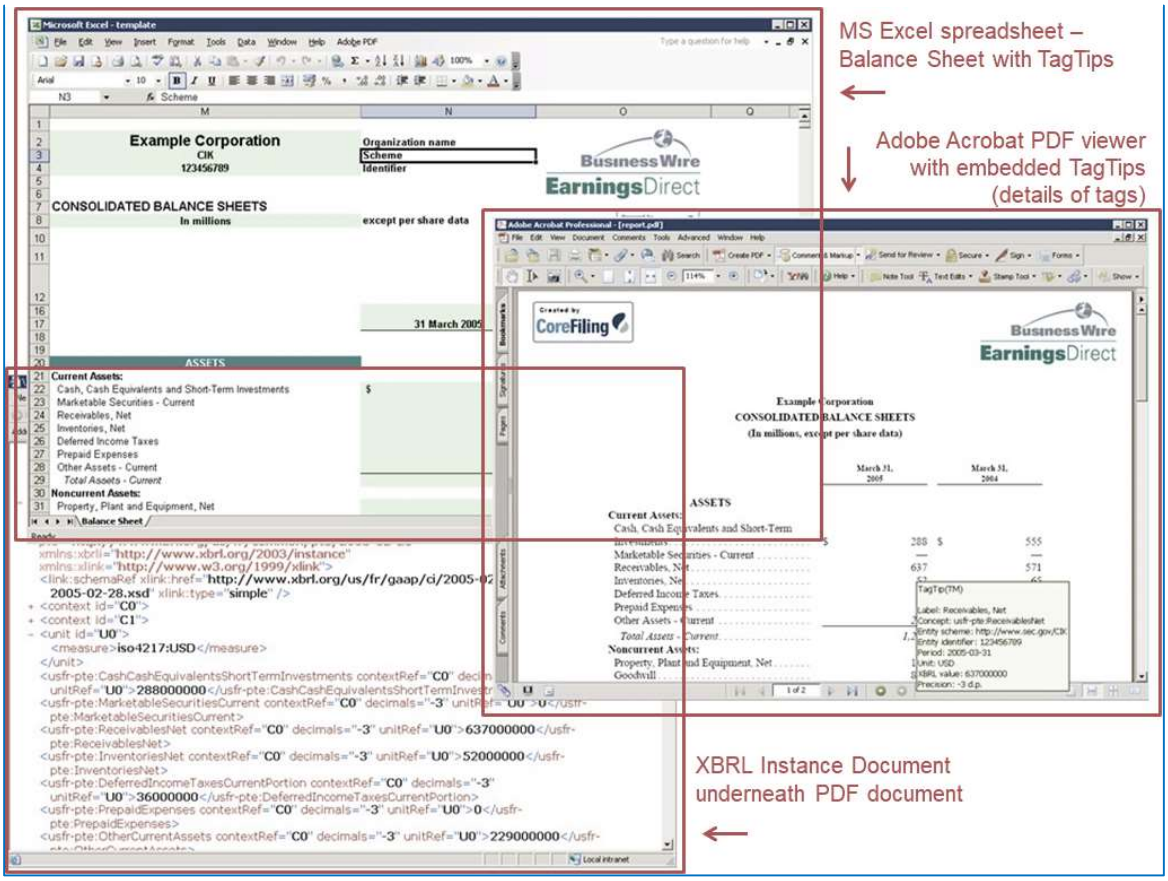


Notably, members of the working group and XBRL UK were involved in the SEC filing programme in the US at the early stages of the development of XBRL project. The USA EDGAR (Electronic Data Gathering, Analysis, and Retrieval) system required the filers to prepare the accounts in a simplified format like HTML or even plain text and add an attachment to the document (SEC, 2005). The filers could choose to accompany their

official filings with a copy in the PDF format. This attachment could be an XBRL document based on the US GAAP taxonomy. The key feature of the US voluntary filing programme was that the filers had the possibility of adding the XBRL filing that was not a formal part of the regulated submission (Boritz and No, 2008). The documents are submitted online and available for a public user to process. Following the same digital reporting mechanism, the Rendering group developed an idea of building XBRL inside a PDF (Figure 3: event 16). The document was branded as Intelligent Financial Statement (IFS) and was claimed to be the first XBRL technology combining both text and machine-readable form (Figure 9).

> *They [regulators] embedded XBRL into PDFs so that the document could be released in PDF and you could mouse over a number, and it would tell you what the text on the element value of that was, and then attached to the PDF is the XBRL. It was a really clever implementation. (IndAssoc4).*
>
> *The thought was that we could embed XBRL inside the earnings releases as PDFs, because at the time the way most of those earnings releases were released, we would actually create something that was useful to the markets. This is what people cared about. (Consort1)*

Figure 9: Sample of Earnings - Direct Template Demonstrating Intelligent Financial Statement (BusinessWire, 2019)



IFS was tested using the XBRL data and PDF files of a number of large corporations (e.g. Ford Motor Company Limited and GM Europe). The main element of IFS is a PDF file which is generated from spreadsheet templates and can be viewed in Adobe Reader® software products. This PDF file uses 'mouseover' labels, called TagTips, to show the properties of the XBRL data which are integrated in the document. The users (e.g. regulators, investors) can retrieve the compete XBRL data and then process and fed them into spreadsheets and other analytical tools. The technology was actively supported and promoted by the CoreFiling as well as Companies House; however, the presentation of IFS to regulators proved that technical production of a financial account using this functionality was difficult and less advantageous than XBRL.

> *The problem was that, technically, it was so difficult to produce the TagTips…really, really hard. We had a lot of difficulty with Adobe technology, and there was no binding between what you saw on the visuals, the display, and the XBRL underneath it. (SoftVen3)*

The main concern was associated with the functionality that did not allow merging visual presentation with an XBRL element embedded in it. Since XBRL tags inside were just an attachment in the PDF document, the connection between presentation and instance document was not built.

> *You could have an XBRL document inside, completely different from what you saw on the display, so technically, it wasn't really a very good way of doing this. (SoftVen3)*

Additionally, IFS caused disagreement between the technical developers and regulators on the high level of expertise required for further adoption of this technology by the software vendors.

> *You had to be a very, very experienced Adobe developer in order to make this stuff work, and, you know, in order to be able to produce it. HMRC didn't like that. They didn't like it because there was only one supplier in the world of this solution – it was us [Software Vendor]. The likelihood of there ever being another supplier was very, very low indeed, because it was really hard to put together – you needed to know your XBRL extremely well, you need to spend a lot of time working on Adobe technology to do it well, so it wasn't good for anybody else to do it. (SoftVen6)*

Apart from the technical difficulties in producing the accounts, another factor to undermine support for this newly-applied functionality was the choice of suppliers of this technology that was limited to the HMRC technical partner and businesses associated with it. The IFS technology was designed by and registered as a product of the software vendor working closely with regulators. However, when the prototype was designed by the technical team of HMRC and their partners, the Corporation Tax Process team suggested that that the idea of building a regulatory standard around proprietary product could not constitute the core of the XBRL project in the UK.

> *It would have been a regulatory standard, built around a product, rather than around a standard, and there's a subtle, but very important, difference there. If you build it around a product, nobody can compete; if you build it around a standard, the whole world can come and do themselves, which is very much more the way they prefer to do it, in this country. (Consort2)*

Having consulted the working group, HMRC gave a negative response and rejected this alternative to XBRL. Despite its limited interessement in the actor-network, the IFS facilitated the acceptance of a new technical artefact combining both human and machine-readable format as a solution to the main problem around rendering functionality associated with the implementation of XBRL. Development of the IFS technology was important as it provided the basis for the future development of the programme of action.

7.3.2 Interessement and Enrolment of HTML: Development of the Microformat technology

Further efforts of the Rendering Working Group to develop technical solution involved the enrolment of the HTML technology into the actor-network. The standardised rendering method with the use of stylesheet allows preparers and consumers of XBRL instance documents generating submitted reports in a variety of formats, including HTML, XLS, and PDF. When the IFS technology comprising XBRL and PDF elements failed to strengthen the network, the actors sought to build associations with the other existing artefacts such as HTML and XLS.

The next option XBRL for e-filing in the UK considered by the Rendering Working Group was so-called the Microformats technology (Figure 3: event 17). The technology draws on the ideas within the HTML community allowing to hide the semantics associated with some information embedding other syntax inside HTML that the browser ignores when processing the file.

> *It's not text, it's not HTML with text, there are some semantics behind this and the micro-tag just embeds those semantics. This is something that the HTML community came up with, which allows you to ….hide some semantics associated with some information that browser has the smarts to understand…And what it did was take the idea that we didn't understand terribly well at the time, but quickly did, which was that you can embed other syntax inside HTML and browsers will ignore it.(Consort1)*

A microformat is one of the web-based approaches of semantic markup which uses HTML/XHTML tags. Multiple experiments with Microformats of the Rendering Working group resulted in the emergence of the initial prototype of the financial statement that was in the XHTML format with embedded syntax that could be

transformed to an XBRL instance document. It was tested on BP's financial statement. The Rendering group attempted developing the micro-tagging framework by seeking technical support from the Microformat community (Mueller, 2007) (Document19).

> *One thought was that maybe one way around the problem was just to embed microformat data into webpages and keep the webpage looking human-readable for these documents that were ultimately human-readable documents anyway and solve the problem just by using Microformat. It became obvious very quickly that microformats or the way microformats work wasn't quite man-enough for the task. (Consort1)*

The debate about the validity of the XHTML element in the file was one of the concerns in the development of the technology. Microformat offered the technical experts of the Rendering Group the possibility to decide "how strong an XBRL element was" (Consort1).

The technology was able to incorporate a number of data attributes into HTML elements which made it inherently a human-readable XHTML file document with the XBRL embedded in it. Its translation mechanism that takes preparer of a document from HTML to the instance documents was claimed to be "heavy and horrid" (Consort4).

Tracing the development of Microformat technology for regulatory filing has illustrated that presentation of data in human-readable form was attractive for the Rending Working Group, however, its functionality was perceived as complex. These complexities could create additional tension between regulators and software vendors developing the filing products for businesses.

7.4 Reaching Stability of Network: Emergence of iXBRL

The next stage of looking for the technical solution to digital filing was associated with combining rendering in Microformat and the XBRL data. The existing XBRL filing mechanism was to separate data and rendering mechanism – prepare data, apply a stylesheet, and render it. When the Rendering Working group realised that any mechanism required creating a language for rendering, the available rendering languages, such as PDF, HTML were claimed to be complex and have large specifications. However, existing relationship with HTML shifted the focus of looking for a new solution to using a viable derivative of HTML – Extensible Hypertext Markup Language (XHTML) (Figure 3: event 19). Nine interviewees who interacted with Microformating emphasised the fact that its development shaped the emergence of iXBRL and was drawn out of it.

> *There were some demonstrations of the Micrformat prototypes…[iXBRL] was a development out of that idea. (SoftVenb)*

Although unsuccessful in its quest to solve the technical issues, Microformat development contributed to building similar technical solutions of embedding syntaxing of data inside XHTML.

> *Conceptually, Inline XBRL draws on the ideas used by the Microformats group. Inline XBRL, like Microformats, rejects the idea that data and formatting must be separate. (XBRL International Inc., 2009) (Document31)*

Technical experts of the Rendering Working group applied the existing mechanism of Microformat and bound XBRL and XHTML creating a new product called Micro-XBRL. The prototype of the technology was presented in a meeting of regulators' technical team

with the Rendering Working Group driven by the XII, and shortly after it was conditionally approved by HMRC.

> *There were two parts to the presentation [of Micro-XBRL to HMRC]. At the time HMRC said if we can standardise this and assuming it works across browsers which it did, but we hadn't been able to show [it] at the demonstration, we'll mandate it. And that's the history of Inline XBRL. It came out of that meeting (Consort1).*

Ultimately, the working group led by the XII presented Micro-XBRL at the XBRL conference in 2007 to enrol more actors into the network and encouraged the technical XBRL community in the UK to develop the expertise and technical knowledge required to improve the first prototype. The new actor-network included members of XBRL UK such as software vendors, two major consulting companies, and technical team and consultants of HMRC and CH. The group worked on the validation issues, developed the new functionality branded Inline XBRL, and began working on requirements documents.

> *We called it Micro- XBRL for a while, because that was in Microformat, and then it stopped being in Microformat, partly because I just couldn't shoehorn all this stuff into little data attributes*[5]*. I wanted people to be able to look at the code and say - I can see what's going on, I understand it. Not that people do look at the code all the time, but when you're trying to sell this to people, you need to be able to show, at every level, this is simple. You want to be able to say this thing is elegant, simple, all the way through – and even if you look at some tagging in the code, you can see, there's an HTML tag, there's the Inline XBRL tag, because it gives people more confidence. So, we moved away from Microformat.*

[5] "Attribute - a property of an element such as its name, balance, data type, and whether the element is abstract" (SEC, 2018b).

Chairman Cox [Securities and Exchange Commission Chairman Christopher Cox], at the SEC, called it interactive data. We called it iXBRL…Apple calls everything with an "i". But that was fine. Consort3).

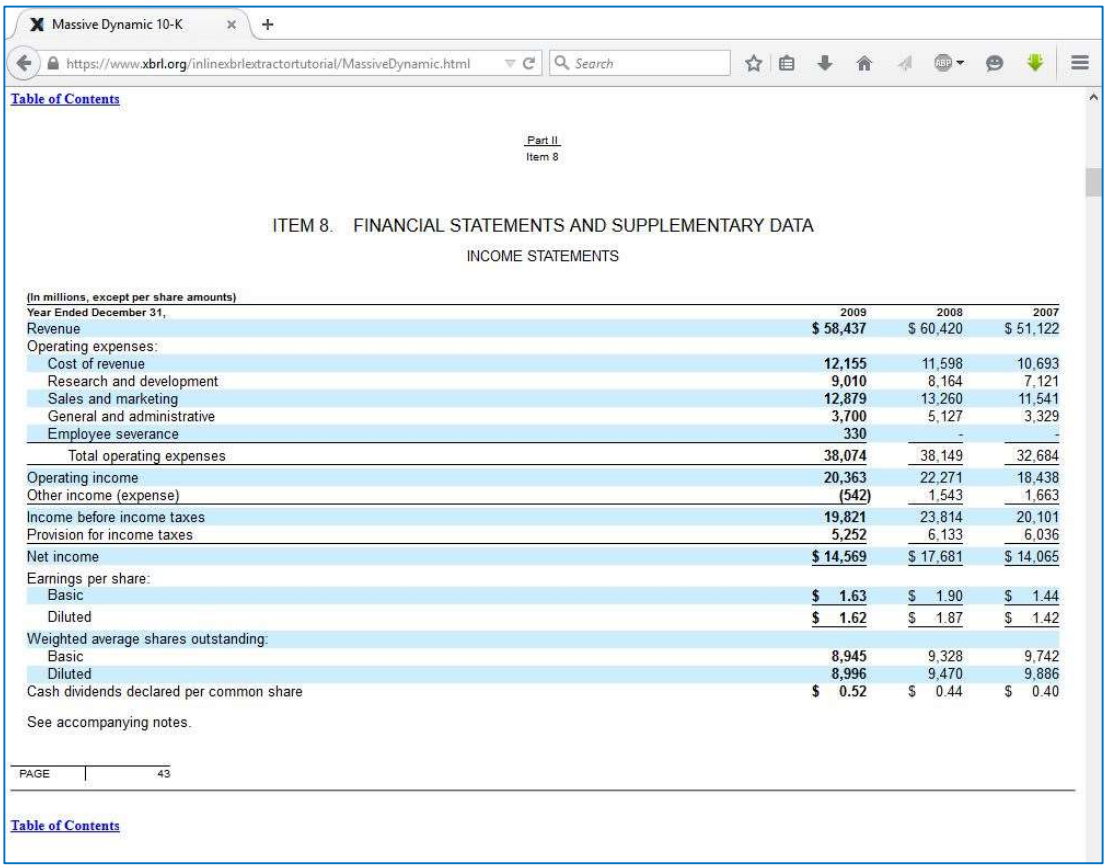
The semantic (*label linkbase*) and formatting tags (*presentation linkbase)* in iXBRL-reports included all untagged elements and formatting instructions that control a printed version of the tagged data items in one document. This rendering mechanism allowed the same presentation of the XBRL data for a filer and a regulator (Figure 10).

Figure 10: Sample of Inline XBRL File Viewed (XBRL International Inc., 2009) (Document31)

(10.1) as HTML Page in Web Browser;

(10.2) through the Tags Viewed in the HTML Source Page;

(10.3) through XBRL Instance Document Extracted from Inline XBRL



Source of: https://www.xbrl.org/inlinexbrlextractortutorial/MassiveDynamic.html - Mozilla Firefox

File Edit View Help

```
<?xml version="1.0" encoding="US-ASCII"?><html xmlns="http://www.w3.org/1999/xhtml"
      xmlns:ix="http://www.xbrl.org/2008/inlineXBRL"
      xmlns:ixt="http://www.xbrl.org/inlineXBRL/transformation/2010-04-20"
      xmlns:link="http://www.xbrl.org/2003/linkbase"
      xmlns:xbrli="http://www.xbrl.org/2003/instance"
      xmlns:xlink="http://www.w3.org/1999/xlink"
      xmlns:iso4217="http://www.xbrl.org/2003/iso4217"
      xmlns:xbrldi="http://xbrl.org/2006/xbrldi"
      xmlns:xbrldt="http://xbrl.org/2005/xbrldt"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="http://www.w3.org/1999/xhtml file:/c:/svn/conformance-rendering/inlineXBRL/schema/xhtml-in

   <head xmlns:us-gaap="http://xbrl.us/us-gaap/2009-01-31"
         xmlns:us-types="http://xbrl.us/us-types/2009-01-31"
         xmlns:dei="http://xbrl.us/dei/2009-01-31"
         xmlns:masd="http://www.massivedynamic.com/20101231">
      <meta http-equiv="Content-Type" content="text/html; charset=US-ASCII" />



      <title>Massive Dynamic 10-K</title>


   </head>


   <body>


      <h5 xmlns:us-gaap="http://xbrl.us/us-gaap/2009-01-31"
          xmlns:us-types="http://xbrl.us/us-types/2009-01-31"
          xmlns:dei="http://xbrl.us/dei/2009-01-31"
          xmlns:masd="http://www.massivedynamic.com/20101231"
          style="text-align: left;">
         <a href="#toc">Table of Contents</a>


      </h5>


      <p xmlns:us-gaap="http://xbrl.us/us-gaap/2009-01-31"
         xmlns:us-types="http://xbrl.us/us-types/2009-01-31"
         xmlns:dei="http://xbrl.us/dei/2009-01-31"
         xmlns:masd="http://www.massivedynamic.com/20101231"
         style="line-height: 11.9pt; margin-top: 0px; margin-bottom: 0px;">
         <small style="font-size: 60%;"> </small>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<xbrli:xbrl xmlns:ixt="http://www.xbrl.org/inlineXBRL/transformation/2010-04-20"
            xmlns:xbrli="http://www.xbrl.org/2003/instance"
            xmlns:link="http://www.xbrl.org/2003/linkbase"
            xmlns:xlink="http://www.w3.org/1999/xlink"
            xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
            xmlns:iso4217="http://www.xbrl.org/2003/iso4217"
            xmlns:xbrldi="http://xbrl.org/2006/xbrldi"
            xmlns:xbrldt="http://xbrl.org/2005/xbrldt">
   <link:schemaRef xmlns:us-gaap="http://xbrl.us/us-gaap/2009-01-31"
                   xmlns:us-types="http://xbrl.us/us-types/2009-01-31"
                   xmlns:dei="http://xbrl.us/dei/2009-01-31"
                   xmlns:masd="http://www.massivedynamic.com/20101231"
                   xlink:type="simple"
                   xlink:href="masd-20101231.xsd"
                   xlink:arcrole="http://www.xbrl.org/2003/linkbase"/>
   <dei:DocumentType xmlns:dei="http://xbrl.us/dei/2009-01-31" contextRef="fy10d">10-
K</dei:DocumentType>
   <dei:DocumentPeriodEndDate xmlns:dei="http://xbrl.us/dei/2009-01-31"
contextRef="fy10d">2010-12-31</dei:DocumentPeriodEndDate>
   <dei:EntityRegistrantName xmlns:dei="http://xbrl.us/dei/2009-01-31"
contextRef="fy10d">MASSIVE DYNAMIC INC</dei:EntityRegistrantName>
   <dei:EntityWellKnownSeasonedIssuer xmlns:dei="http://xbrl.us/dei/2009-01-31"
contextRef="fy10d">Yes</dei:EntityWellKnownSeasonedIssuer>
   <dei:EntityCurrentReportingStatus xmlns:dei="http://xbrl.us/dei/2009-01-31"
contextRef="fy10d">Yes</dei:EntityCurrentReportingStatus>
   <dei:EntityFilerCategory xmlns:dei="http://xbrl.us/dei/2009-01-31"
contextRef="fy10d">Large Accelerated Filer </dei:EntityFilerCategory>
   <dei:EntityPublicFloat xmlns:dei="http://xbrl.us/dei/2009-01-31"
contextRef="fy10e_MeasurementDate"
                          unitRef="USD"
                          decimals="0">149769380603000000</dei:EntityPublicFloat>
```

The rendering is controlled by the preparer of an iXBRL document and subsequently the filing could be easily read by tax inspector. iXBRL represented a key development in the programme of action and addressed the issues of XBRL constraint associated with the rendering functionality. It also presented a user-friendly XBRL instance document by providing a direct translation mechanism between XHTML and XBRL. The visual part of the new technology consists of XHTML which could be rendered by browsers, and, at the same time, embedded XBRL tags can be successfully processed by the appropriate XBRL-parsing application. Thus, reports in the iXBRL format appear unchanged to a human reader and can be processed by the converter applications.

> *The main objective of Inline XBRL is to allow XBRL-based data to be displayed in situations where the producer wants to preserve a specific visual presentation of the information, and the consumer wants to be able to validate the input data.(Background information and guidance, Supporting document for a Candidate Recommendation 2009)*

Another issue, the emergence of iXBRL, addressed is the tension around the extensibility of the XBRL taxonomies.

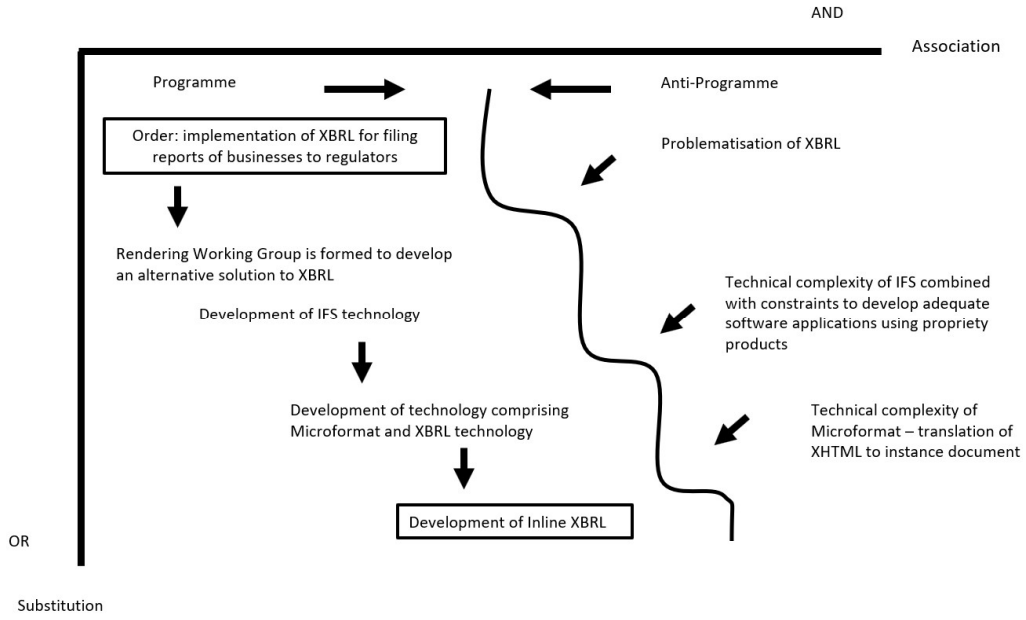
> *The fact that Inline [XBRL] gave you this ability to markup the core bits of data that you are interested in, but leave the rest of the information that the company wants to disclose as human-readable HTML gives you the best of both worlds. And especially as the core data and the human-readable version of that are actually one and the same data items. (Consort1)*

The newly-developed iXBRL provided affordance that enabled the project to enrol and maintain critical support offered by software vendors and accountancy firms. Filers were no longer encouraged to use the extensions and focus on entity-specific details (HMRC, 2013) (Document14).

> *If no suitable tag is available to represent a particular item of data in a financial report, then the item may be left untagged and simply represented by ordinary text in Inline XBRL.(XBRL UK 2013, p. 10) (Document39)*

With iXBRL the specific high complexity level elements of reports can be handled by embedding them in the document in HTML format making it a "natural extension" (Business2). The regulator's capacity to acquire more detail to investigate any distinctive business case and modify the taxonomy accordingly established a "very top-down strategy for implementation and a top-down architecture that allows for extensibility" (SOFTVEN6). As extension taxonomies must be created according to strict rules to reach consistency of analysis and comparison of the tagged reports, regulators attempted to restrict the flexibility of reporting companies, and kept the power to control multiple aspects of the digital financial reporting. The level of comparability of the tagged reports therefore is judged from the perspective of the regulator, and not investor. With this approach it is difficult to analyse the financial reports in depth required for professional investors and analysts. To address the extensibility issue, XBRL project made a detour away from the investor-focused reporting as the affordance of iXBRL to incorporate a broad variety of existing relations and concepts of the filings is controlled by regulators.

Figure 11: Translation Mapping of the Development of Inline XBRL



Successful enrolment in the iXBRL network of all of the accounting representative bodies and major software vendors represented the alignment of the diverse interests of various groups of actors. The underlying ideas of the iXBRL functionality became institutionalised in official documentation and specifications and maintained the stability of the network. iXBRL shifted the XBRL implementation in the UK and had significant implications: iXBRL addressed the problem of rendering by presenting user-friendly XBRL instance document. The key affordance of iXBRL is that it visualises financial statements in XBRL format in a human-readable form. It allows filers to keep the layout of their reports while users' (e.g. regulators) computers can provide a rationale for the embedded XBRL tags in them. The technology was presented to the public in July 2007 when the Public Working Draft was published to set out the requirements for a standardised method for the rendering of XBRL instance documents in human-readable form. The regulators began leading efforts to implement iXBRL by further engaging and mobilising software vendors, accounting representative bodies, and businesses.

7.5 Conclusion of the Chapter

The findings of the research were analysed in Chapter 6 and Chapter 7. The aim of this part of the thesis was to analyse the complex socio-technical relationship through which iXBRL was developed. Specifically, using qualitative evidence the emergence of iXBRL was examined using key ANT concepts discussed in Chapter 4. The analysis of the XBRL adoption for tax filings in the UK allowed us to understand the preconditions for the emergence of iXBRL and to trace how the antecedent network of XBRL implementation constituted an important step toward building a network for the later fabrication of iXBRL.

Latour's (1992) translation map was applied to provide a visual representation of the key pressures and tensions in the XBRL network (Figure 11). This conceptualization helped improve current understanding of how and why XBRL failed to become implemented. The analysis found that XBRL suffered from a number of constraints which restricted its highly publicised benefits for the preparers of accounts. This view reflects that XBRL affordance was not able to meet the expectations and needs of heterogeneous groups of actors, and, for this it was altered and lost its rendering mechanism. As some actors could not cope with the affordances it offered, XBRL sacrificed itself for the alternative actors – iXBRL.

The problematisation of XBRL took place at an early stage of the XBRL project in the UK. The idea of generating an identical presentation of submitted financial statements was discussed at initial meetings of the key actors in the project. However, the regulators and their allies discovered no easy capability that allowed them to render and present user-friendly XBRL instance documents in a similar format for both filers and users. Thus, the financial reporting in XBRL format involves a higher degree of freedom for users when

processing the XBRL data as the rendering mechanism of XBRL allows a user (e.g. a tax inspector, investment analyst) to process filed information by making assumptions about how that should look using a number of scripts. The XBRL technology design was intended to focus on a free data exchange between information business systems rather than presentation of data. Ultimately, XBRL rendering functionality produced the perception of both capability for regulators and constraint for filers.

To overcome this constraint, the regulators and their allies attempted to produce a visually more accessible rendering mechanism restricting the manipulation of the filed data for the end user. In doing so, the XBRL technology was altered by giving it features that control the presentation and eliminate flexibility of users to process the data. By incorporating the affordance of the XBRL technology with the capabilities of the alternative rendering solution, iXBRL helped the network to grow and regulators to fulfil their obligations by addressing the pressures from major accounting firms, businesses, and industry associations. This network became the site of the failure to achieve support for implementation at HMRC. The challenge with implementing the aforementioned technical solutions (IFS and Micro-XBRL) was that they reflect the complex context where they were designed. This insight draws attention to important questions regarding the multiple and conflicting perspectives of each group of actors resulted in the emergence of the new actors, formulated from a number of previous technological failures.

Chapter 8 Summary of Findings and Discussion

8.1 Introduction to the Chapter

Chapter 8 summarises the findings of the analysis against the research questions. It will consolidate the findings by offering a way of understanding the controversies inherent in XBRL. The increasing international adoption of iXBRL served as the main inspiration for contributing to the growing research on digital reporting standards. The interest of academic and business community is heightened by the increasing adoption of XBRL by financial regulators in many countries including world's major economies such as the USA, Australia, Japan, and the UK (Troshani and Doolin, 2005; Srivastava and Kogan, 2010; Mousa, 2011; Troshani, Parker and Lymer, 2015). Emergence of iXBRL has opened up a new perspective on the future of digital business reporting which formed the basis for this research exploration. This study examined the antecedent network of actors and actants by exploring the tensions between different groups of actors engaged in the implementation of XBRL. To unfold the relational outcome of the network, the research adopted the ANT concept of sociology of translation (Callon, 1984) which allowed tracing the tensions and affordances of the technology within the XBRL project in the UK and illustrating the development of the programme of action using Latour's translation map.

8.2 Addressing Research Questions

The following part of the chapter focuses on the discussion of the main findings reached in this research enquiry. The section outlines how the findings address the issues identified from the review of literature presented in Chapter 3 following the research questions

formulated in Chapter 1 and Chapter 5 of the thesis. The researcher will explain how the objective of the study – investigating the development of iXBRL – has been fulfilled. To achieve this research objective, a central research question seeking to understand how iXBRL 'comes into being' (Latour, 2005) and becomes an actor in its own right, connecting with various other actors and actants, was addressed. The central research questions and two subsidiary questions that guided this PhD project are outlined below:

Central Research Question: How did a new digital business reporting standard – Inline XBRL - emerge during the implementation of XBRL for filing reports of businesses to HMRC and Companies House in the UK?

Research sub-question 1: How did the formation of the network of actors to implement XBRL lead to the failure of XBRL in the regulatory programme of action?

Research sub-question 2: How did the network of actors affect the development of alternatives to XBRL and result in the emergence of iXBRL?

To comprehensively understand the development of iXBRL, the study investigated the network in which iXBRL developed. Accordingly, the data analysis presented in Chapter 6 and Chapter 7 was narrowed down into two broad areas. The first part of analysis included the investigation of the antecedent network formed around iXBRL predecessor in the UK – XBRL - in order to understand interests and needs which led to the iXBRL emergence. The next task of the researcher involved analysis of the transition to iXBRL which was fabricated in response to the need to make affordances to enrol different actors into the project (Latour, 1992).

To achieve this, this thesis examined the interests inscribed in iXBRL and how they reflected the perception of the digital reporting by heterogeneous groups of actors

involved in exchange and communication of business information. This analysis focussed on XBRL affordances which are argued in the present study as being a key force working against implementing it and causing disruption in the XBRL project in the UK.

8.2.1 Addressing the research sub-question 1

Research sub-question 1: How did the formation of the network of actors to implement XBRL lead to the failure of XBRL in the regulatory programme of action?

This section outlines the main findings pertaining to the first sub-question. These findings are drawn mainly from discussion provided in Chapter 6 and Chapter 7 of this thesis. The analysis of the collected data established that the development of iXBRL as a socio-technical object reflected the perception of the digital business reporting by heterogeneous groups of actors involved in the project to implement XBRL. The project which culminated in the mandate of iXBRL for regulatory business reporting was the outcome of the network of allies seeking to attract resources and maintain momentum. The network emerged as part of a bricolage of human and non-human actors (Latour, 1987) in response to the perceived constraints of XBRL for the use for filing companies' reports to the regulators.

The findings of this research have indicated that the story of iXBRL stems from the formation of the network to implement XBRL for the regulatory business filing in the UK. Interview accounts and documentary evidence have shown that this network formed the programme of action and served as the site of the failure to achieve support for the implementation of digital reporting at UK regulators.

When tracing the origin of the network, the study has found Lord Carter's review of HMRC's online service (Carter, 2006) was an important actor that established actor-network formation and positioned the financial regulators - HMRC and CH - as major figures directing the project. By issuance of this document, the government gave authority to the regulators and XBRL to become a crucial element of the e-government adoption (Mousa, 2011) that is aimed at responding to the demand for better regulation and oversight of financial reporting (UN DESA, 2010). The finding about an important role of regulators in this project supports previous research highlighting the regulatory driving force behind multiple projects of XBRL adoption worldwide (Troshani and Doolin, 2007; Troshani and Lymer, 2010; Lowe, Locke and Lymer, 2012; Guilloux, Locke and Lowe, 2013). Moreover, this also accords with the observation which has shown what triggered the emergence of the new actor-network prior to the issuance of Lord Carter's review. The study has found early developments of the network were mainly led by the collaboration between the regulators and XBRL UK.

The analysis has also demonstrated the success and failure of the network to enrol other groups of actors at the early pre-XBRL stages of the project development. The study has found that a group of governmental agencies, including the Cabinet Office, the Office for National Statistics, and the Financial Services Authority, attempted to join the actor-network by expressing interest in the digital reporting technology and forming Financial Transactions Working Group. However, HMRC did not align efforts for developing the XBRL project due to the perceived complexity of the technology. Thus, XBRL could not achieve the objective to become a modern channel for formalising the communication between multiple governmental agencies (Cordella, 2007). As a result, its main role as an element of e-government framework remained limited to the government-citizens or

regulator-business communication and this initially intended affordance of XBRL was not realised.

As for the successful enrolment of other groups of actors, accounting industry associations were present in the network at the early stages of its development. The study has found a strong relationship between XBRL and ICAEW. The literature has also reported that ACCA supported the use of XBRL as early as in 2004 (ACCA 2004) (Document1) and strengthened the network by providing resources for the commencement of the project (Troshani, Parker and Lymer, 2015). Moreover, HMRC received major support of its technical partner – the first software developing company that joined the network and has shown "consistent behaviour" (Latour, 1999, p. 27) of accepting regulators' view during the project.

Overall, the findings of the research have demonstrated the difference in the perceived affordances of XBRL at the beginning of the actor-network formation. Regulators sought to reduce the cost of processing reports and improve surveillance and regulation of e-filing. XBRL UK maintained the perception that XBRL can offer a functionality enabling greater level of communication of business data between preparers and consumers of XBRL reports, whereas accounting representative bodies were interested in XBRL potential to improve communication between businesses and investors. The interest to continue the programme of action allied the actors within the network and kept the momentum around the XBRL project. However, further evidence has shown that the multiple perspectives on the potential of XBRL were translated early in the network and, subsequently, did not allow to "flow effortlessly through…willingly participating in the construction and spread of black boxes" (Latour, 1987, p. 120). At that stage, the actors

were required "to interest people in the outcome of their claims" (Latour, 1987, p. 120) and to design strategies to enrol more allies to reduce the tension.

The findings have shown that in response to the pressure to build new alliances within the network, HMRC contracted XBRL UK and their technical partner to develop the UK XBRL taxonomy which was one of the major steps towards enrolment and subsequent mobilisation of actors. Furthermore, multiple attempts were made to enrol new actors by improving the communication between filers, software vendors, XBRL, accounting software and other actors by organising workshops, conferences, roadshows and developing XBRL induction packs to achieve "building partnership arrangements across the tax professional and software developer communities" (HMRC 2009, p. 11) (Document13). The main result of these early efforts was the achievement of problematisation of the existing filing systems. XBRL was perceived as an attractive solution to the main issues associated with e-filing of businesses to regulators. Thus, the interests of the actors were shared and translated and all actors within the network had to agree on a programme of action – implementation of XBRL to improve efficiency, accuracy, and comparability of reporting.

The analysis reported in Chapter 6 and Chapter 7 has shown that different efforts at engagement of other groups actors with XBRL were made after the issuance of Lord Carter's review; some with limited success. As the findings have demonstrated, the attempts to enrol more actors laid the foundation for conflict of interests rather than collaboration. One source of conflict was the weak interest of software vendors in developing and incorporating XBRL into the accounting software applications. The interviewees overwhelmingly agreed that development of adequate XBRL software applications was one of the key points of contention in the project.

The XBRL literature agrees that XBRL applications are an integral part of the implementation of XBRL for business reporting (Troshani and Doolin, 2007; Boritz and No, 2008; Dunne *et al.*, 2013). XBRL is a data standard that requires the use of software products that enable producing and processing XBRL reports. The software products can provide efficacy of the XBRL technology and evidence of its usefulness for filers and consumers of XBRL filings (Troshani, Parker and Lymer, 2015), and hence they become the source of stability in the actor-network to implement XBRL-enabled filing mechanism. However, the findings have shown a number of reasons for the weak interessement of software vendors and developers.

Firstly, initial live demonstrations of XBRL held by regulators and XBRL UK failed to convince software vendors of the XBRL potential. Latour discusses the power of visual demonstration of technology as an important channel in reinforcing the performance of technology:

> *After hours of waiting for the experiment to resume, for new guinea pigs to become available, for new endorphin samples to be purified, we realise that the invitation of the author (``let me show you'') is not as simple as we thought. It is a slow, protracted and complicated staging of tiny images in front of an audience. ``Showing'' and ``seeing'' are not simple flashes of intuition… We came to the laboratory in order to settle our doubts about the paper, but we have been led into a labyrinth. (Latour, 1987, p. 67)*

The spokespersons of XBRL - regulators and XBRL UK – allowed XBRL to perform and to demonstrate its affordances. During this process promoters of XBRL showed their support for the technology in its current state and delegated to XBRL, whereas software vendors and other actors were encouraged to develop a similar perception of XBRL. This process also brought into the network "the rules within the software or principles and methods within accounting systems" (Alan Lowe, 2000, p. 233). In other words, it was

not simply a demonstration of technology, but much more a matter of implying a certain use of XBRL and "passing a claim along without transforming it into some other claim or into someone else's claim" (Latour, 1987, p. 207). However, the analysis has demonstrated that the original aim of the demonstrations was not achieved, and XBRL affordances communicated by regulators and XBRL UK were not apparent.

The future demand in XBRL software products was not illustrated as there was no emphasis on the mandate of XBRL for filing reports to regulators at that stage of the project. Moreover, the costs of the investments in the new products combined with the unexpected complexity which could possibly risk the stability of the rest of the accounting software packages for major accounting software providers created tension within the network about the capabilities of XBRL to meet the interests and needs of heterogenous groups of actors related to the project.

Secondly, there was a general lack of XBRL experience and expertise in the UK, although strong XML expertise was available within the software vendor community. BASDA was offering XML solutions which were technically more attractive and accessible to its members. A weak interessement of major software vendors resulted in perceiving XML as a more viable alternative for filing the accounts and tax computations in the UK by the vocal BASDA members.

Furthermore, the findings have shown that the regulatory leadership was widely perceived as the driving force behind the project to implement XBRL and the power of regulators to mandate XBRL fuelled the debates about the benefits XBRL can provide for businesses. Software vendors as well as major consulting firms started questioning the usefulness of XBRL and its affordance to improve communication between businesses and other users of reports such as investors and analysts. Tax filing in XBRL format was

perceived as one of the means to reduce costs for governmental agencies and improve their surveillance. This resulted in the situation when XBRL affordances to improve comparability of reports and interoperability between computer platforms were not perceived as apparent by the software vendors and, therefore, they invested limited resources in the development of new products. The findings show that at that stage the available XBRL applications could not fully address the issues associated with reporting using XBRL. The interviews and documentary analysis suggest that in the environment of an increasing interest in XBRL reporting at that time of the project it would be difficult for XBRL to become established and remain viable without the support of independent software vendors and software developers. Even though the regulator acting as an ultimate ally of the standard has the power to require its application (Guilloux *et al.* 2013; Chua *et al.* 2008), increased usage of XBRL by using inadequate software applications resulted in problematisation of XBRL that threatened the stability of the network.

Furthermore, the analysis reported major consulting firms, largely depending on accuracy of the submitted accounts when they provide services to their clients, strongly represented their interests when regulators were seeking to generate more support for the programme of action. Non-compliant submissions produced by inadequate applications may result in financial issues for the filers. There is a legal obligation of the consulting and audit firms to submit the accounts in an accurate manner on behalf of businesses that outsource these services. To address the pressure from inadequate software applications available for the business reporting community and negative perception of usefulness and ease of use of XBRL by the consulting firms, the regulators and XBRL UK were forced to further mobilise the actors to strengthen the network by developing an alternative solution to problematisation of XBRL. Until XBRL becomes an accepted part of the reporting

infrastructure, it is under constant pressure to attract new allies and enrol new participants of the programme of action.

Overall, XBRL affordances acting to enrol new participants of the programme of action have failed to do so. The claim of XBRL benefits to improve comparability of reports, efficiency, and interoperability of filing has not become dominant and stable within the network. As Leonardi (2011b) observed, actors make choices whether affordances constrain or permit them to achieve their goals and act accordingly. The findings of the research have illustrated that XBRL was perceived as constraining the interests and needs of software vendors, major consulting firms and accounting industry associations representing filers. Despite the power of the main XBRL allies – regulators – to mandate the use of XBRL, the network could no longer rely on the existing resources to continue working on such challenging tasks as building and maintaining XBRL taxonomy and attracting the key groups of actors. As a result, the network had to either change the goal and programme of action, alter the reporting routine or change the technology (Leonardi 2011b).

> *When an existing material agency is imbricated with a new human agency (material —> human) people may be likely to change their routine, and when an existing human agency is imbricated with a new material agency (human —> material) a technology changes…The result is that a change in a technology at any given time is linked to the routines that came before it. (Leonardi 2011b, p. 163)*

As illustrated in the case of the XBRL project, the existing reporting routine (practice) was problematised – the process that followed by the introduction of XBRL and its material agency. Thus, the network drawing on the infrastructure created out of past routines and technologies became engaged in the construction of new affordances and

constraints (Leonardi 2011b). This construction of new perceptions can create new opportunities for actors to act and change their goals and technology features.

The next section of this chapter will explore the local setting of the network that created new affordance of XBRL and allowed the emergence of iXBRL.

8.2.2 Addressing the research sub-question 2

Research sub-question 2: How did the network of actors affect the development of alternatives to XBRL and result in the emergence of iXBRL?

By tracing the network of allies, the research has found that one of the most critical conversations in the UK XBRL technical community was the discussion of what the filers expected and needed in terms of rendering XBRL content. An implicit issue was the debate whether XBRL data would ever be rendered to present the data in a "user-friendly format" (Reg 3). The findings have confirmed that a large number of technical developers believed that XBRL data would only ever be transmitted from computer to computer and would never be seen by the human eye. On the other side of this discussion there are proponents of the counter argument that filers and regulators who only recently switched from paper filing to electronic filing of financial reports would still have significant trust issues and would need to see the XBRL content rendered for auditing and signing-off purposes before publishing data to the potential users and consumers of business information. As the analysis have shown, the trust issue linked to the legacy repercussions associated with reproducing financial reports in their original format (also called *roundtripping)* served as an impetus to challenging the programme of action. Problematisation of XBRL created a deep contention that forced the XBRL technical community in the UK driven by regulators and XBRL UK working groups to work on

resolving the rendering issues. The research suggests that XBRL affordances worked against the efforts to implement it as the network did not allow XBRL to realise them. In doing so, XBRL provided ideal conditions for a new solution to challenge the existing practice and continue the programme of action by altering the technology.

To understand the interests inscribed in iXBRL, it is important to recognise the active controversy (Lee and Oh, 2006) of a long, multifaceted history of XBRL and refer to the original beliefs inscribed in digital business reporting. The impact of the global financial crisis created an opportunity to challenge stable infrastructure of financial reporting (Chen, 2013; Blankespoor, Miller and White, 2014). XBRL was claimed to help to diminish the complexity and distortion of financial data to the public and to ensure accurate and high quality information to be delivered to the consumers in a more efficient manner (Boritz and No, 2008; Piechocki and Felden, 2009). The pressure to improve the existing practices of business reporting and to prevent similar crisis resulted in the search for modern solutions and, in doing so, offered a strong position for the extensively publicised XBRL (Blankespoor, Miller and White, 2014). For this reason, actors such as financial regulators and major consulting firms were amongst the early adopters and key proponents of XBRL. The findings confirmed that modernisation of the EDGAR system by the SEC in the US using the XBRL standard was used as a reference project for the UK regulators. The analysis showed that the actor-network in the UK was intertwined with the individuals and organisations of the XBRL International, and the negotiation space of the project was created around the newly established UK regional branch of the consortium that also included people working on implementing XBRL standard in the US. As a result, the issues associated with the financial reporting in the US were translated into the UK network, and the question of rendering was one of central concerns problematised in that way.

8.2.3 XBRL Rendering as the Main Affordance

The rendering mechanism of XBRL remained unstable in the face of its problematisation. The study reveals that the rendering affordance of XBRL was perceived as a constraint that did not allow the programme of action to implement XBRL to continue. Regulators' efforts to strengthen the network of XBRL around XBRL implementation created previously aforementioned tension between software vendors, major audit and consulting firms and the international consortium working together with the regulators. Heterogeneity of interests translated by key actors in the network allows generating more support, momentum and access to expertise, but, at the same time, it challenges the stability of the network and requires compromises in support of the actors that provide better resources (Rowbottom and Locke, 2013). As a response, the programme of action 'brace[ed] itself' against the pressures by making detours (Latour 1992, p. 247).

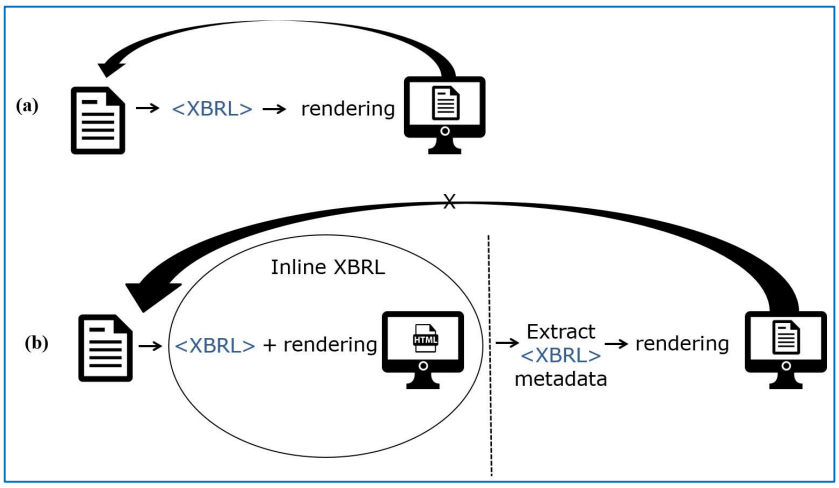
As the findings have demonstrated, the detour of the network was mainly reflected in the formation of the Rendering Working Group that sought to offer a new solution to the concerns of major consulting firms, software vendors, and regulators representing tax inspectors. The Rendering Working Group provided a local setting – a laboratory – where actors could work on solutions and "make as many mistakes as they wish" (Latour, 1983, p. 164) and "stage" (Latour, 1983, p. 152) the experimental solutions.

The next section will present the discussion of the rendering functionality in detail in order to provide an understanding of who and how was affected by the emergence of iXBRL.

As the research has demonstrated, the iXBRL rendering mechanism was developed from the three attempts of the Rendering Working Group to construct a 'bricolage of

technologies' enrolled in the network. To ensure the programme of action continued, XBRL remained present within the network and was 'bound' with other actors such as PDF, HTML, and Microformat. As the rendering issue was closely linked to XBRL affordance of extensibility of taxonomies, the outcome of the efforts of the Rendering Working Group was a practical response to rendering, re-rendering and tagging the submitted data. Figure 12 illustrates the difference the *roundtripping* mechanism between XBRL and iXBRL.

Figure 12: Roundtripping Mechanism with (a) XBRL, (b) iXBRL



In practice, iXBRL allows a preparer to provide documents that can be viewed in a web browser with built-in XBRL tags which are then processed automatically by the XBRL data processing applications. The software applications used by prepares provide them with the possibility of formatting and presenting the HTML version of their financial reports in exactly the same way as the reviewer and consumer of the report would do, e.g. tax inspector or investor. Yet the XBRL element of reports is still included in the content of the submitted document and applications can process the data accurately which allows avoiding transcriptions errors that commonly occur during further 'consumption' of data (Business2). For instance, if the data is just copied from an HTML page into the MS Excel

document, the metadata cannot be transferred to enable validation and assurance that the correct contextual information is presented. iXBRL documents contains metadata that can be processed by the users' application. As a result, the rendering methodology becomes an integral part of the individual financial document.

Overall, to address the issue of consistent presentation of data along the supply chain of business information, iXBRL inscribed a flexible and robust technology that allows filers to have "freedom around presentation" (IndAssoc6) and better control over what an end user consumes. What is interesting is that the presentation and appearance of iXBRL-enabled reports is only judged from the perspective of the report preparer and regulator as the user. If XBRL affords the control of rendering reports to the end user of the technology (Lowe, Locke and Lymer, 2012), iXBRL gives back this control to the preparer of the report who can choose the ordering of the information and its appearance within the context. This finding suggests that the outcome of the programme of action was a technology that mainly realised the interests of two key groups of actors - filers and regulators. The single most important observation to emerge from these findings of the research was concerned with what was lost for the XBRL project during this process.

Despite the fact that iXBRL allowed the programme to continue, the initial motivation behind XBRL projects to allow better decision making and "maintain dialogue with existing shareholders and potential investors" (UK Investor Relations Society, 2003) was not realised. iXBRL technology can create scalability and comparability issues for the end users of XBRL data such as investors and analysts. iXBRL makes it challenging to process companies' reports for comparative purposes by the aggregators of financial data or review individual instance documents for tax inspection purposes. Preparers of iXBRL document assigning specific labels for taxonomy concepts and order them in certain order

maintain flexibility of the presentation of reports, but this process breaks the connection with the information within XBRL taxonomies. Considering the issues of comparability of XBRL reports explored in the XBRL literature (Debreceny *et al.*, 2010; Lowe, Locke and Lymer, 2012) associated with presenting financial information in the context of other data items, the iXBRL rendering mechanism moved the digital business reporting a step back, at least in respect to the limitation of data processing.

In general, therefore, the findings suggest that the newly emerged rendering affordance of iXBRL both allows and constrains the action of actors interacting with XBRL data. It "solves that business problem of HMRC and others of the fact that preparers and accountants are in a 'presentation world'" (Reg4) and, most importantly, it strengthened the network and allowed the programme of action to implement XBRL to continue. However, at the same time it constrains the digital business reporting by limiting actions of regulators and other market users of XBRL data in further processing data. Thus, affordances inscribed in iXBRL cannot build better communication between prepares and users of the reports as they focus on the data exchange between regulators and filers.

The research has also provided useful insights that highlight the misleading perception of iXBRL and XBRL as the same open digital business reporting standards. Accordingly, the terms are often used interchangeably by representatives of each group of actors in the network, even during discussions of the development of specific technical functionalities at the multiple events organised by regulators, the consortium or accounting representative bodies. However, there are different views about whether iXBRL simply replaces XBRL as "the next version of XBRL" (SOFTVEN8) or whether it is a fundamentally different socio-technical object only incorporating some aspects of XBRL that "should be named HTMLx" (SoftVen4). An iXBRL file can be called an HTML file

that is viewed in a web browser in the same way as any other HTML page, but an iXBRL file contains the XBRL tags that can be processed by the XBRL-enabled applications. This fundamental difference in referring to the presentation or rendering mechanism within technology shed some light on how the key actors understood the construction of the texts for the user consumption. If the technology was required to highlight the visualisation of filings, then the 'i' element of iXBRL was emphasised.

> *Inline XBRL was the way of annotating HTML, make the document more intelligent. There are no other international standards of the same type. (Reg5)*

If the technology was required to demonstrate affordances associated with comparability of reports and flexibility of processing digital data, then iXBRL was called XBRL and the terms were used interchangeably.

> *XBRL can amalgamate your results with other peoples' results, it can compare a company in the UK with a company in Japan. It can look at Barclays results here and look at bank of Hong Kong, Shanghai. (Consort4)*

The need to highlight the iXBRL and XBRL was an important part of regulators' project.

> *iXBRL is simply a variant or a dialect of XBRL designed around the rendering of XBRL. We also need to be looking at the questions of how people have attempted to render XBRL because XBRL... the entire driver for XBRL was to make a human-readable rendering of XBRL – so it was only one path to that. (Consort5)*

As initial iXBRL development work was often perceived as the fabrication of another version of XBRL, iXBRL required persistent effort of regulators and other key actors involved in the project to make iXBRL a black boxed technology and gain taken-for-granted status "where its label replaces its contents" (Bonner & Chiasson 2005, p. 273). As analysis of the findings has shown, to some extent the iXBRL label replaced XBRL.

As the project to implement iXBRL is developing, it became an innovative technology providing new capabilities and "taking XBRL to the next level" (Consort4).

Overall, the research suggests that the iXBRL rendering mechanism was developed to allow the same presentation of the XBRL instance document for filers and regulators. iXBRL restricts the manipulation of the filed data for the end user and fulfils the regulatory obligations to implement a new digital business reporting standard by ensuring support of major accounting firms, software vendors, and accounting industry associations representing businesses. The study has traced the network of actors and explored how each group of actors within the actor-network translated their interests and needs and contributed to the failure of XBRL and subsequent shift from XBRL to iXBRL. The implications of the research of the emergence of iXBRL will be discussed in the next part of the chapter.

8.3 Chapter Summary

This chapter outlines the main findings reached in this research and demonstrates how those findings address the research questions derived from the previous academic literature. The discussion of findings is divided into two broad areas according to the subsidiary research questions. Overall, the answers to those two questions help to understand how the contention around the digital reporting technology led to the emergence of iXBRL. Subsequently, this understanding helps to achieve the objective of exploring the main tension and pressures leading to the shift from XBRL to iXBRL. The study traced the network of actors and actants and highlighted the compromises regulators and their allies had to make to attract more support to the programme of action. Overall, the findings from this study suggest that iXBRL was fabricated in response to

the need to make affordances to translate interests of different actors and enrol them into the XBRL project to implement XBRL.

Chapter 9 Conclusion

The findings of this research project have a number of implications discussed in this concluding chapter. The researcher will consider contribution to literature, accounting practice, and Actor Network Theory. This chapter presents the main contribution of the research by analysing the implications of the development of iXBRL in further adoption of digital business reporting, and assess the implications of using ANT as a methodological and analytical framework in this research. The chapter concludes by identifying opportunities for further research.

9.1 Contribution to Theory

This study provides useful insights that highlight the unique point of the development of the new digital business reporting standard and revealed important detours and the associated affordances made during the development of iXBRL for financial reporting in the UK. ANT provided the methodological perspective that helped to capture dynamics of the complex relational forces in the emergence of iXBRL, and highlighted the unplanned nature of the new actor emerging in the socio-technical network (Law, 1986; Latour and Porter, 1996). In this research I have adopted the ANT methodological and analytical framework by employing the sociology of translation and drawing on the work of Orlikowski (2007) that emphasise the performative constitutive entanglement of the social and the technical. This research has extended the application of ANT to studying the features of XBRL entangled in the socio-material practices of the XBRL project in the UK and resulted in development of the new technological artefact. The research sought to extend the theoretical contribution to digital business reporting standard setting by addressing additional ANT framing devices such as translation (Latour 1992; Ramiller

2005; Troshani & Lymer 2010; Lee & Oh 2006) and affordances (Akrich & Latour 1992; Leonardi and Barley 2008).

The research contributes by highlighting the value of ANT and its key concept of translation as a strong tool for explaining the complexity and the emergent causality of the process of developing new digital reporting standard. A major finding from this study suggests that the process of the iXBRL development comprised translation of multiple interests of heterogeneous group of actors and resulted in a number of pressures and tensions that change the trajectory of the development of the XBRL project to implement digital business reporting standard in the UK. The research showed that the existing differences in the perception of the technological artefact lead to the search of alternative solutions to improve the collaboration between the actors.

By tracing the development of the network of actors involved in the emergence of iXBRL, the study illustrated that the affordances of technology can work against the efforts of the key actors to implement it. In particular, the study shows that the development of iXBRL comprising the new functionality reflects a deep contention about the possibilities and constraints of digital business reporting standards. The findings of this study have illustrated a unique situation when iXBRL, as a new technological artefact, was developed as a solution to the issues associated with the presentation of business reports, and, on the other hand, it is the presentation and document-centric functionality digital business reporting is claimed to eliminate from the current practices of reporting.

The findings confirmed that XBRL was problematised and considered 'too free' (SoftVen7a), therefore it needed to be altered (Leonardi 2011). The affordances of XBRL to improve comparability of reports, and efficiency and interoperability of reporting were not apparent for a part of actors within the actor-network and worked as a constraint to

its implementation. The findings are in agreement with Parchoma (2014) who suggested that affordances can be seen "as enablers, restrictors, and regulators within human-computer interactions" (Parchoma, 2014, p. 366). Since iXBRL comprises both XBRL functionality that enables digital reporting and document-centric XHTML element, these affordances become conflicting. They are perceived as limiting and enabling. These findings are contradictory to the Leonardi's (2011) interpretation of affordance proposing that actors make choices whether technology is perceived positively or negatively. The finding of the current study is that it is the socio-technical setting and the associations between actors that make a positive affordance of XBRL work against the efforts of actors to implement it. These results corroborate the ideas of Latour (1992) that suggest that affordance is "that a device allows or forbids from the actors – human and nonhuman – that it anticipates; it is the morality of a setting both negative (what it prescribes) and positive (what it permits)" (Latour, 1992, p. 261). These findings add to our understanding of the emergence of technology affordances by suggesting their powerful role to enact changes and their potential to make the network to succeed or fail.

An awareness of the important role of affordances before the technology becomes black-boxed or taken for granted emphasises the gains and losses of the network in the technology adoption. It also highlights the complex socio-technical nature of digital reporting standard that is perceived in a different way at different stages of its development. Overall, this study contributes by demonstrating that the application of the concept of affordance in an ANT study can offer valuable insights into how technology is perceived as proscribing and permitting certain actions simultaneously.

9.2 Contribution to Academic Literature on Digital Reporting and Accounting Practice

This study investigated an important, yet little-researched area concerned with the development of digital business reporting. Technologies for digital reporting now provide options beyond electronic formats like PDF and HTML for greater levels of automation and standardisation in the production and consumption of business reporting and accountability data (Bergeron, 2003; Binstock *et al.*, 2005; Hoffman and Watson, 2010). The increasing adoption of XBRL for financial reporting to regulators has positioned this research within the regulatory setting. The particular focus of this thesis is the UK regulatory setting of the implementation of XBRL that resulted in the emergence of iXBRL. iXBRL is now being adopted by regulators worldwide (XBRL International Inc., 2016) (Document34). One of the recent developments in this area is a new regulation of the European Commissions to require member countries to mandate a single digital reporting standard for listed companies by 1st January 2020 (ESMA, 2016). As part of that process ESMA is required to develop technical rules and infrastructure for financial reporting in the iXBRL format:

> *The digital format will allow users such as investors, analysts and auditors to carry out software supported analysis and comparison of large amounts of financial information. Access to annual financial reports for both professional and retail investors is essential for creating robust capital markets across the EU…The Inline XBRL format has the potential to bring financial reporting into the digital age (ESMA, 2016b).*

Following these developments, in June 2018 the SEC has voted to adopt iXBRL for reporting financial statement information and risk and return summaries in the US.

> *The amendments are intended to improve the data's usefulness, timeliness, and quality, benefiting investors, other market participants, and other data users. The amendments are also intended to decrease, over time, the cost of preparing the data for submission to the Commission (SEC, 2018a).*

The increasing interest in adopting iXBRL raises the possibility of iXBRL being used as the only media of the regulated communication of corporate financial and non-financial information and an important element of e-government in the next years ahead. As this research examines the interests and needs inscribed in iXBRL during its development and iXBRL affordances, the findings provide valuable insights in time for policy development in Europe and elsewhere. The UK setting is of particular interest in the European context because HMRC and Companies House were the first regulators that adopted iXBRL. Despite the scope of this study being limited to the development of iXBRL rather than adoption of digital reporting standard in the UK, the research has contributed to our understanding of what drives the adoption of digital reporting standard and how the efforts to improve the current reporting infrastructure affect the change and acceptance of the complex accounting innovation. In particular, the research makes several noteworthy contributions to the literature on digital reporting.

Firstly, the findings add to a growing body of literature on the critical role of regulators in adopting digital business reporting (Troshani and Rao, 2007; Piechocki and Felden, 2009; Troshani and Lymer, 2010; Guilloux, Locke and Lowe, 2013; Shan, Troshani and Richardson, 2015). The core developments of the project to implement XBRL were led by HMRC and CH who actively resolved the main technical, political and financial issues. However, the result of the regulatory driving force to reduce the tensions between different groups of actors was the shaping technology according to their needs and interests. iXBRL allowed keeping the power of regulators to control multiple aspects of

reporting, including the rules of extending taxonomies and presentation of reports for the tax inspectors processing the XBRL data. What is interesting is the increasing international adoption of iXBRL by financial regulators worldwide who use the UK iXBRL case as an example of successful implementation of digital business reporting. This indicates that iXBRL is a stable, taken for granted (Hanseth and Monteiro, 1997) element of the infrastructure of reporting whose strengths and weaknesses are not questioned any more. This highlights the significance of the findings of this research exploring what was gained and what was lost during the development of iXBRL. When assessing iXBRL, digital business reporting adopters will benefit from referring to the findings of this study when evaluating the role of iXBRL affordances, such as rendering functionality and extensibility of taxonomy. The research helps to increase awareness of the powerful role of presentation of reports that improves practices of filers and regulators and restricts processing of the digital data. Regulators and practitioners may see the relevance of this research in understanding the limitations of iXBRL.

Secondly, this thesis introduces valuable insights into the complexities associated with the development of the new accounting technology. The research has confirmed that implementation of XBRL heavily depends on the successful development and maintenance of XBRL taxonomies that are based on accounting standards. However, the current research provides additional evidence of the compromise of regulators and their allies on reflecting the complexity of the accounting standards or focusing on the presentation of the submitted documents. The study suggests that the existing network compromised the flexibility and complexity of the taxonomies to make it more accessible to filers and regulators. This finding questions the possibility of the iXBRL-enabled digital reporting in the shape as it was developed in the UK to represent the complexity of the associations between accounting concepts. What is clear in a digital reporting

environment is the difficulty of reading disclosures in context (Lowe, Locke and Lymer, 2012), and this research suggests that this affordance was not the central focus of the development of iXBRL. As a result, iXBRL does not provide the possibility to interpret data items in context. As adoption of digital reporting heavily depended on the efforts of regulators and their supporters who made choices about the gains and losses digital reporting standard could offer, accessibility of iXBRL has found to be essential for the project to continue.

9.3 Suggestions for Future Research

This PhD research has made considerable strides in its contribution to understanding digital business reporting.

This study has raised several suggestions for future research. Adoption of digital business reporting standards is a rich area. Further research could examine the implementation of iXBRL after mandate to use it for e-filing of financial reports in the UK. The research of the use and perceived benefits of iXBRL by investors and analysts of financial data was out of scope of this study, mainly due to the limited traces left in the network to implement XBRL in the UK. The references to the end users of XBRL reports were minimal in the analysis. This is indicative of the need for the research of the lack of interest of this key group of actors who are integral to the success of iXBRL projects worldwide. I also recognise that the study of UK national setting and focus on the XBRL network in the UK is not well suited to a generalisation objective. The limited research of the development of iXBRL in other contexts could be extended to provide important insight on the tension and pressures regulators face when adopting a digital business reporting standard in other national jurisdictions.

There is certainly scope for more research on the continued development and adoption of XBRL and iXBRL in other areas of data science that can open new perspectives on automated exchange and analysis of business reports. Moreover, emerging technologies such as blockchain start to mature which triggers regulators to take advantage of new initiatives and new possibilities and constraints of XBRL in this regard, including the rendering and presentation mechanism. The focus of this research is very timely. Given the wide range of participating organisations and the rich nature of data collected, further research of the evolution of iXBRL is needed in order to address the issues of comparability and accessibility associated with digital business reporting.

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Appendices

Appendix 1: Email to Potential Participants

Dear [name],

I am a research student at the Open University Business School interested in digital reporting development in the UK. I am currently undertaking a research project on the emergence of Inline XBRL. The project is supervised by [supervisory team]. The purpose of the study is to understand the development and use of iXBRL and its contribution to digital reporting in the UK.

As you played a key role in developing iXBRL, your insights are important to the research. If you can find some time for an interview, we will arrange a time and place convenient to you. I sincerely believe that your knowledge and experience can contribute to our understanding and impact policy recommendations that emerge from the research.

Please find the description of the project in the Information sheet attached. The research has been approved by The Open University's ethical review committee. If you have any queries concerning the nature of the research or your potential role in it, please do not hesitate to contact me by email [researcher's email address].

Thank you for your time and consideration. I look forward to your reply and hope to have the chance to discuss iXBRL and digital reporting with you soon.

Kind regards,

Lidia Mishchenko

[email signature]

Appendix 2: Information Sheet

The Development of a New Digital Reporting Standard: Inline XBRL

Information sheet for participants

Purpose

The study explores the emergence of a digital business reporting standard Inline XBRL (iXBRL). The iXBRL technical functionality associated with a visual presentation of XBRL reports potentially changes the interaction of various groups of users in the supply chain of financial information. The main purpose of the research is to examine the early motivations of regulators for commencing the iXBRL project, and further negotiation process of a variety of stakeholder groups that impact the development of iXBRL. The project aims to improve the understanding of key events and activities affecting longer-term programmes of establishing digital business reporting technology and the impact of the emergence of iXBRL in this process.

Data collection and your confidentiality

We have identified you as having experience in the development of Inline XBRL, and we would like to interview you for this project. The interview can be conducted either at your workplace, at the Open University Business School or in public place at an agreed time. The interview will explore your views on digital reporting, Inline XBRL, and related technologies. It facilitates the research if we can digitally record the interview, but if you are not comfortable with this, we will only make notes during the interview. To maintain confidentiality, we will code the interview so that your identity will be kept separate from the data unless you give additional consent for disclosure. As the number of people involved in the development of digital reporting is relatively small and your views may be

identifiable, if we wish to quote verbatim anything you have said we will include the quote using a pseudonym (e.g. Regulator1).

The data from the interview and any documentary evidence you may be able to provide will be used for informing policy decisions and academic purposes. The data collected will be anonymised and securely stored on password-protected computers for a period of 10 years, only transferred using encrypted USB Flash Drivers, and after that period securely destroyed. Electronic data will be only accessible to the researchers and if required to the personnel for an authorized academic audit.

Your rights

You may choose not to participate in this research, omit or refuse to respond to any question, retract any comment or the whole of your interview up to [three months' time after the date of an interview]. You may ask the researchers questions to clarify any further points about the study.

Please feel free to contact me or my supervisors at the Open University for further details.

Lidia Mishchenko [contact details]

PhD Researcher

[name] [contact details]

Lead Supervisor

[name] [contact details]

Supervisor

Appendix 3: Consent Form

The Development of a New Digital Reporting Standard: Inline XBRL

Statement of Consent

The purpose of this consent form is to clearly state the conditions of your participation in the research. It is designed to protect your rights as described in the information sheet. Please complete and sign below if you are happy with these conditions.

I consent to participate in this research project concerning the development of digital reporting in the UK. I have been given a written description of the project which has been explained to me.

I understand that the data generated will be entered into a filing system or database and will be stored securely at the Open University as described in the Information sheet and will only be used for the purpose of research, statistical and audit purposes in accordance with the provisions of the Data Protection and Freedom of Information Acts. I understand that the information which is being collected as part of the research project will only be accessed by authorised personnel involved in the project.

I understand that the confidentiality of the information that I provide will be safeguarded subject to any legal requirements and no identifiable personal data will be published without additional consent for disclosure.

I understand that my participation is voluntary and that I am free to refuse to answer any question or withdraw the full interview without giving any reason at any time up to <<3 months' time after the date of an interview>>. If I withdraw my data, they will be removed from the study and will be destroyed.

I consent to this interview being digitally recorded □Yes □No

Signature _____ Date _____

Appendix 4: Open University Human Research Ethics Committee Research Approval

The Open University

From	Dr Duncan Banks Chair, The Open University Human Research Ethics Committee
Email	duncan.banks@open.ac.uk
Extension	59198
To	Lidia Mishchenko, FBL
Subject	*"Digital reporting in the United Kingdom."*
Ref	HREC/2014/1668/Mischenko/1
AMS/RED Submitted	24 March 2014
Date	26 March 2014

Memorandum

This memorandum is to confirm that the research protocol for the above-named research project, as submitted for ethics review, **has been given a favourable opinion** by the Open University Human Research Ethics Committee by **Chair's action** as it is thought to be low risk.

Please make sure that any question(s) relating to your application and approval are sent to Research-REC-Review@open.ac.uk quoting the HREC reference number above. We will endeavour to respond as quickly as possible so that your research is not delayed in any way.

At the conclusion of your project, by the date that you stated in your application, the Committee would like to receive a summary report on the progress of this project, any ethical issues that have arisen and how they have been dealt with.

Regards,

Dr Duncan Banks
Chair OU HREC

Appendix 5: Framework of Themes for Interview with Regulators

The Development of a New Digital Reporting Standard: Inline XBRL

Framework of Themes for Interview

The purpose of this document is to give an overview of the topics I would like to discuss with you at our meeting. The interview is semi-structured, which means that the questions below are intended only as a guide. Thank you again for agreeing to participate.

i. Introduction

What do you see as your role in HMRC and the XBRL/iXBRL project?

The origins and development of Inline XBRL

In your view what were the key influences behind the initial push to tag data for filing to HMRC?

What motivated the iXBRL project?

What are the distinctive features of iXBRL and how did they develop out of the initial motivations?

Could the same outcomes have been achieved by using a different data standard or technology?

What do you think worked particularly well in the process of developing iXBRL?

Are there aspects of the project that have not performed up to expectation?

ii. The part played by stakeholders

Who were the key stakeholders involved in the iXBRL development and what was the nature of their participation?

Did HMRC seek stakeholder participation in particular stages of the project?

What important differences did stakeholders make to the development?

How did the iXBRL project change the interaction of HMRC with filers?

What issues were faced in collaborating with stakeholders and what affect did they have on the project?

iii. Current status and future of the project

How close to completion do you regard the project?

Are there specific aspects of iXBRL that are still underdeveloped or new features that could be added?

What do you see as the future of iXBRL in the UK and internationally?

Appendix 6: List of Interviews

Table 2: List of Interviews

Interview Code	Organization Category	Code Name	Duration, hours:min
1	XBRL International	Consort1	1:12
2	XBRL International, Large Accounting Firm	Consort2	0:59
3	XBRL International	Consort3	1:00
4	XBRL International, Software Vendor	Consort4	0:34
5	XBRL International, Large Accounting Firm	Consort5	0:35
6	Professional accounting bodies/industry associations	Consort6	1:00
7	Business Representatives	IndAssoc1	0:54
8	Business Representatives	IndAssoc2	1:01
9	Business Representatives	IndAssoc3	0:59
10	Business Representatives	IndAssoc4	0:54
11	Business Representatives	IndAssoc5	0:58
12	Business Representatives	IndAssoc6	0:54
13	Large Accounting Firm, Filers	Business1	0:47
14	Filers	Business2	1:01
15	Filers	Business3	1:02
16	HMRC, Regulators	Reg1	0:49
17	HMRC, Regulators	Reg2	1:13
19	HMRC, Regulators	Reg3	1:13
18	HMRC, Regulators	Reg4	0:55
20	HMRC, Regulators	Reg5	1:07
21	FRC, Regulators	Reg6	1:06
22	Companies House, Regulators	Reg7	0:57
23	HMRC, Regulators	Reg8	1:12
24	Companies House, Regulators	Reg9	1:14
25	Companies House, Regulators	Reg10	0:38
26	Software Vendor	SoftVen1	1:04
27	Software Vendor	SoftVen2	0:58
28	Software Vendor	SoftVen3	1:05
29	Software Vendor	SoftVen4	0:48
30	Software Vendor	SoftVen5	0:58
31	Software Vendor	SoftVen6	1:25
32	Software Vendor	SoftVen7a	1:17
33	Software Vendor	SoftVen7b	1:26
34	Software Vendor	SoftVen8	1:34

Appendix 7: Transcription Guidelines

Table 3: Transcription Guidelines

List of Acronyms and interviewees	Participants were anonymised by assigning them numbers and titles selected depending on the group of actors they have been allocated to by the researcher, e.g. SoftVen3
Filler words, filled pauses, nonverbal sounds	Words such as *hm, huh* were omitted as an intelligent verbatim transcription approach was chosen.
Inaudible Information	If any part of the recordings was not clear or difficult to understand after multiple attempts, the text was put in square brackets (i.e. [inaudible segment]) and consequently coded as 'inaudible segment'.
Quotes	If interviewees quoted their colleagues or any other individuals, the text was put in single quotes; e.g. my colleague said: 'this is not a viable option for us'. Any grammar and syntax errors identified by the researcher were corrected without significant changes of the content of the quoted text.

Additional Guidelines	If any technical jargon associated with the used of technology was used by the interviewees, the text was assigned an explanation in square brackets with the word *meaning*; e.g. roundtripping [meaning…]. If any information provided by the interviewees was omitted, it was marked with the three dots in square brackets; e.g. […] To follow the ethical guidelines, any text containing the information that could help to identify the role, job position, or previous professional background of the participant was put in square brackets and coded as hidden; e.g. [hidden].

Appendix 8: Documentary Evidence

Document Reference	Analysis Code
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